Channels and Maximum Power Settings for Cisco Aironet Lightweight Access Points

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Channels and Maximum Power Settings for Cisco Aironet Lightweight Access Points
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Preface

Audience

This guide is for the networking professional who installs and manages Cisco Aironet access points and bridges.

To use this guide with lightweight access points, you should have experience working with a Cisco Wireless LAN Controller and be familiar with the concepts and terminology of wireless local area networks.

Purpose

This guide provides the channel and maximum power settings you need to install your lightweight access points and bridges in supported regulatory regions.

For hardware information about Cisco Aironet access points and bridges, refer to the product hardware installation guides for your access points and bridges available from the Cisco.com at this URL:

http://www.cisco.com/en/US/products/hw/wireless/

The access point products are listed under the “Access Points” and “Outdoor Wireless” sections. Choose the needed product, then click **Install and Upgrade** in the Support box.

For information about Cisco Wireless LAN Controllers, refer to the Cisco documentation sets available under the “Wireless LAN Controllers” section. Choose the needed controller, then click on the documentation type in the Support box.

Organization

This guide is organized into these chapters:

Chapter 1, "Cisco Aironet 1000 Series Access Points," lists the 1000 series lightweight access point radio channels and the maximum power levels supported by the world's regulatory domains.

Chapter 2, "Cisco Aironet 1100 Series Access Points," lists the 1100 series lightweight access point radio channels and the maximum power levels supported by the world's regulatory domains.

Chapter 3, "Cisco Aironet 1130 Series Access Points," lists the 1130 series lightweight access point radio channels and the maximum power levels supported by the world's regulatory domains.

Chapter 4, "Cisco Aironet 1140 Series Lightweight Access Points", lists the 1140 series lightweight access point radio channels and maximum power levels supported by the world's regulatory domains.

Chapter 5, "Cisco Aironet 1200 Series Access Points," lists the 1200 series lightweight access point radio channels and the maximum power levels supported by the world's regulatory domains.

Chapter 6, "Cisco Aironet 1240 Series Access Points," lists the 1240 series lightweight access point radio channels and the maximum power levels supported by the world's regulatory domains.

Chapter 7, "Cisco Aironet 1250 Series Lightweight Access Points," lists the 1250 series lightweight access point radio channels and the maximum power levels supported by the world's regulatory domains.

Chapter 8, "Cisco Aironet 1300 Series Access Points," lists the 1300 series lightweight outdoor access point/bridge radio channels and the maximum power levels supported by the world's regulatory domains.

Chapter 9, "Cisco Aironet 1500 Series Mesh Access Points," lists the 1500 series lightweight outdoor mesh access point radio channels and the maximum power levels supported by the world's regulatory domains.

Chapter 10, "Cisco Aironet 1520 Series Mesh Access Points," lists the 1520 series lightweight outdoor mesh access point radio channels and the maximum power levels supported by the world's regulatory domains.

Conventions

This publication uses these conventions to convey instructions and information:

Interactive examples use these conventions:

- Terminal sessions and system displays are in `screen` font.
- Information you enter is in **`boldface screen`** font.
- Nonprinting characters, such as passwords or tabs, are in angle brackets (< >).

Notes, cautions, and timesavers use these conventions and symbols:

Tip Means the following will help you solve a problem. The tips information might not be troubleshooting or even an action, but could be useful information.

Note Means reader take note. Notes contain helpful suggestions or references to materials not contained in this manual.

Caution Means reader be careful. In this situation, you might do something that could result equipment damage or loss of data.

Related Publications

These documents provide information about the access points and bridges:

- Cisco Aironet 1000 Series Lightweight Access Point Hardware Installation Guide
- Cisco Aironet 1100 Series Access Point Hardware Installation Guide
- Cisco Aironet 1130AG Series Access Point Hardware Installation Guide
- Cisco Aironet 1140 Series Lightweight Access Point Getting Started Guide
- Cisco Aironet 1200 Series Access Point Hardware Installation Guide
- Cisco Aironet 1240AG Series Access Point Hardware Installation Guide
- Cisco Aironet 1250 Series Access Point Hardware Installation Guide
- Cisco Aironet 1300 Series Access Point/Bridge Hardware Installation Guide
- Cisco Aironet 1500 Series Outdoor Mesh Access Point Hardware Installation Guide
- Cisco Aironet 1520 Series Outdoor Mesh Access Point Hardware Installation Guide
- Cisco IOS Software Configuration Guide for Cisco Aironet Access Points
- Cisco Wireless LAN Controller Configuration Guide

Click this link to browse to the Cisco Wireless documentation home page:

http://www.cisco.com/en/US/products/hw/wireless/

To browse to the access point and bridge documentation, scroll down to the Product Portfolio section and select a product. The documentation is available from the Support box.

To browse to the Cisco Wireless LAN Controller documentation, click **Cisco 4400 Series Wireless LAN Controllers** or **Cisco 2100 Series Wireless LAN Controllers** listed in the "Standalone Controllers" section under "Wireless LAN Controllers." The documentation is available from the Support box.

Obtaining Documentation, Obtaining Support, and Security Guidelines

For information on obtaining documentation, obtaining support, providing documentation feedback, security guidelines, and also recommended aliases and general Cisco documents, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

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CHAPTER 1

Cisco Aironet 1000 Series Access Points

This chapter lists the IEEE 802.11b/g (2.4-GHz) and the IEEE 802.11a (5-GHz) channels and maximum power levels supported by the world's regulatory domains for the Cisco Aironet 1000 Series Lightweight Access Point. For additional product hardware information refer to the *Cisco Aironet 1000 Series Lightweight Access Point Hardware Installation Guide*.

The following topic is covered in this appendix:

- Channels and Maximum Power Levels, page 1-2

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Channels and Maximum Power Levels

IEEE 802.11b/g (2.4-GHz Band)

When shipped from the factory, the access points support the channels and maximum power levels listed in Table 1-1 and Table 1-2 for their regulatory domain.

Note In Table 1-1 and Table 1-2, the operating data rates (in Mbps) are shown in the CCK and OFDM table cells. For example: CCK 1-11 indicates CCK data rates of 1 to 11 Mbps.

Table 1-1 Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 6.5-dBi Antennas

Channel ID	Center Freq (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains														
		–A and –B					–C					–E				
		CCK 1-11	OFDM 9-24	OFDM 36	OFDM 48	OFDM 54	CCK 1-11	OFDM 9-24	OFDM 36	OFDM 48	OFDM 54	CCK 1-11	OFDM 9-24	OFDM 36	OFDM 48	OFDM 54
1	2412	20	17	17	17	17	14	14	14	14	14	14	14	14	14	14
2	2417	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
3	2422	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
4	2427	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
5	2432	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
6	2437	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
7	2442	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
8	2447	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
9	2452	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
10	2457	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
11	2462	20	17	17	17	17	14	14	14	14	14	14	14	14	14	14
12	2467	–	–	–			14	14	14	14	14	14	14	14	14	14
13	2472	–	–	–			14	14	14	14	14	14	14	14	14	14
14	2484	–	–	–			–	–	–	–	–	–	–	–	–	–

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Table 1-2 Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 6.5-dBi Antennas

Channel ID	Center Freq (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains															
		–I	–K	–N					–J	–P –U	–R	–S	–T				
		All CCK and OFDM		CCK 1-11	OFDM 9-24	OFDM 36	OFDM 448	OFDM 54	All CCK and OFDM				CCK 1-11	OFDM 9-24	OFDM 36	OFDM 448	OFDM 54
1	2412	14	14	20	17	17	17	17	17	17	14	14	20	17	17	17	17
2	2417	14	14	20	20	20	19	18	17	17	14	14	20	20	20	19	18
3	2422	14	14	20	20	20	19	18	17	17	14	14	20	20	20	19	18
4	2427	14	14	20	20	20	19	18	17	17	14	14	20	20	20	19	18
5	2432	14	14	20	20	20	19	18	17	17	14	14	20	20	20	19	18
6	2437	14	14	20	20	20	19	18	17	17	14	14	20	20	20	19	18
7	2442	14	14	20	20	20	19	18	17	17	14	14	20	20	20	19	18
8	2447	14	14	20	20	20	19	18	17	17	14	14	20	20	20	19	18
9	2452	14	14	20	20	20	19	18	17	17	14	14	20	20	20	19	18
10	2457	14	14	20	20	20	19	18	17	17	14	14	20	20	20	19	18
11	2462	14	14	20	17	17	17	17	17	17	14	14	20	17	17	17	17
12	2467	14	14	–	–	–	–	–	17	17	14	14	–	–	–	–	–
13	2472	14	14	–	–	–	–	–	17	17	14	14	–	–	–	–	–
14	2484	–	–	–	–	–	–	–	17[1]	17[1]	–	14[1]	–	–	–	–	–

1. Channel 14 allowed for 802.11b data rates only.

IEEE 802.11a (5-GHz Band)

When shipped from the factory, the outdoor access points support the channels and maximum power levels listed in Table 1-3 and Table 1-4 for their regulatory domain.

Note In Table 1-3 and Table 1-4, the operating data rates (in Mbps) are shown in the OFDM table cells. For example: OFDM 9-24 indicates OFDM data rates of 9 to 24Mbps.

Note To obtain the most current maximum power levels for the EMEA (–E) regulatory domain, refer to the EMEA (–E) regulatory document that shipped with your access point.

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Table 1-3 Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 6-dBi Antennas

Channel ID	Center Freq (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains													
		–A				–B				–C			–E		
		OFDM 9-24	OFDM 36	OFDM 48	OFDM 54	OFDM 9-24	OFDM 36	OFDM 48	OFDM 54	OFDM 9-36	OFDM 48	OFDM 54	OFDM 9-36	OFDM 48	OFDM 54
UNII-1 (5150-5350 MHz)															
34	5170	–	–	–	–	–	–	–	–	–	–	–	–	–	–
36	5180	15	15	15	15	15	15	15	15	–	–	–	14.5	14.5	14.5
38	5190	–	–	–	–	–	–	–	–	–	–	–	–	–	–
40	5200	17	17	17	17	17	17	17	17	–	–	–	14.5	14.5	14.5
42	5210	–	–	–	–	–	–	–	–	–	–	–	–	–	–
44	5220	17	17	17	17	17	17	17	17	–	–	–	14.5	14.5	14.5
46	5230	–	–	–	–	–	–	–	–	–	–	–	–	–	–
48	5240	15	15	15	15	15	15	15	15	–	–	–	14.5	14.5	14.5
52	5260	20	20	18	17	–	–	–	–	–	–	–	14.5[1]	14.5[1]	14.5[1]
56	5280	20	20	18	–	–	–	–	–	–	–	–	14.5[1]	14.5[1]	14.5[1]
60	5300	20	20	18	–	–	–	–	–	–	–	–	14.5[1]	14.5[1]	14.5[1]
64	5320	17	17	17	17	–	–	–	–	–	–	–	14.5[1]	14.5[1]	14.5[1]
5470 to 5725 MHz															
100	5500	–	–	–	–	–	–	–	–	–	–	–	20[1]	18[1]	17[1]
104	5520	–	–	–	–	–	–	–	–	–	–	–	20[1]	18[1]	17[1]
108	5540	–	–	–	–	–	–	–	–	–	–	–	20[1]	18[1]	17[1]
112	5560	–	–	–	–	–	–	–	–	–	–	–	20[1]	18[1]	17[1]
116	5580	–	–	–	–	–	–	–	–	–	–	–	20[1]	18[1]	17[1]
120	5600	–	–	–	–	–	–	–	–	–	–	–	20[1]	18[1]	17[1]
124	5620	–	–	–	–	–	–	–	–	–	–	–	20[1]	18[1]	17[1]
128	5640	–	–	–	–	–	–	–	–	–	–	–	20[1]	18[1]	17[1]
132	5660	–	–	–	–	–	–	–	–	–	–	–	20[1]	18[1]	17[1]
136	5680	–	–	–	–	–	–	–	–	–	–	–	20[1]	18[1]	17[1]
140	5700	–	–	–	–	–	–	–	–	–	–	–	20[1]	18[1]	17[1]
5725 to 5850 MHz															
149	5745	20	19	18	16	20	19	18	16	19.5	18	16	–	–	–
153	5765	20	19	18	16	20	19	18	16	19.5	18	16	–	–	–
157	5785	20	19	18	16	20	19	18	16	19	18	16	–	–	–
161	5805	20	19	18	16	20	19	18	16	19	18	16	–	–	–
165	5825	20	19	18	16	20	19	18	16	–	–	–	–	–	–

1. Dynamic frequency selection (DFS) and transmit power control (TPC) are required (uniform spreading is not required for the –P and –U regulatory domains).

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Table 1-4 Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 6-dBi Antennas

Channel ID	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains												
		–I	–K	–N				–J	–P	–U	–R	–S	–T	
		OFDM All	OFDM All	OFDM 9-24	OFDM 36	OFDM 48	OFDM 54	OFDM All	OFDM All	OFDM All	OFDM All	OFDM All	OFDM 9-484	OFDM 54
UNII-1 (5150-5350 MHz)														
34	5170	–	–	–	–	–	–	18	–	–	–	–	–	–
36	5180	15	15	15	15	15	15	–	15	15	–	15	–	–
38	5190	–	–	–	–	–	–	18	–	–	–	–	–	–
40	5200	15	15	17	17	17	17	–	15	15	–	15	–	–
42	5210	–	–	–	–	–	–	18	–	–	–	–	–	–
44	5220	15	15	17	17	17	17	–	15	15	–	15	–	–
46	5230	–	–	–	–	–	–	18	–	–	–	–	–	–
48	5240	15	15	15	15	15	15	–	15	15	–	15	–	–
52	5260	15[1]	17[1]	20	20	18	17	–	11[1]	–	–	14[1]	–	–
56	5280	15[1]	17[1]	20	20	18	17	–	11[1]	–	–	14[1]	15	15
60	5300	15[1]	17[1]	20	20	18	17	–	11[1]	–	–	14[1]	15	15
64	5320	15[1]	17[1]	17	17	17	17	–	11[1]	–	–	14[1]	15	15
5470 to 5725 MHz														
100	5500	–	17[1]	–	–	–	–	–	–	–	–	–	–	–
104	5520	–	17[1]	–	–	–	–	–	–	–	–	–	–	–
108	5540	–	17[1]	–	–	–	–	–	–	–	–	–	–	–
112	5560	–	17[1]	–	–	–	–	–	–	–	–	–	–	–
116	5580	–	17[1]	–	–	–	–	–	–	–	–	–	–	–
120	5600	–	17[1]	–	–	–	–	–	–	–	–	–	–	–
124	5620	–	17[1]	–	–	–	–	–	–	–	–	–	–	–
128	5640	–	–	–	–	–	–	–	–	–	–	–	–	–
132	5660	–	–	–	–	–	–	–	–	–	–	–	–	–
136	5680	–	–	–	–	–	–	–	–	–	–	–	–	–
140	5700	–	–	–	–	–	–	–	–	–	–	–	–	–
5725 to 5850 MHz														
149	5745	–	16	20	19	18	16	–	–	–	–	16	17	16
153	5765	–	16	20	19	18	16	–	–	–	–	16	17	16
157	5785	–	16	20	19	18	16	–	–	–	–	16	17	16
161	5805	–	16	20	19	18	16	–	–	–	–	16	17	16
165	5825	–	–	–	–	–	–	–	–	–	–	–	–	–

1. Dynamic frequency selection (DFS) and transmit power control (TPC) are required (uniform spreading is not required for the –P and –U regulatory domains).

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Special Country Restrictions

Table 1-5 lists special restrictions for wireless operation in some countries.

Table 1-5 Special Country Restrictions for Wireless Operation

Country	Frequency Band (GHz)	Regulatory Domain	Special Limitation and Restrictions
Japan	5	–J, –P, and –U	Operation limited to indoor use only.
Mexico	2.4	–N	End user must limit 2.4 GHz operation to 2450 to 2483.5 MHz and 36 dBm EIRP[1].
Russian Federation	5	–E	End user must limit 5 GHz operation to 5150-5250 MHz and 5650 to 5725 MHz.
United States	5	–A and –B	Operation limited to indoor use only from 5150-5250 MHz.

1. EIRP (dBm) = maximum output power (dBm) + antenna gain (dBi)

Changing the Lightweight Access Point Output Power

This section provides instructions for changing the 1000 series lightweight access point output power.

The output power on the 1000 series lightweight access points can be changed only using a 2600 series or 4400 series controller, the controllers on a Cisco Wireless Services Module (WiSM), or a Cisco Wireless Control System (WCS).

Note Administrator privileges may be required in order to change access point settings.

Note Regulatory domains are set at the factory and cannot be changed by the user.

Note See the *Cisco Wireless LAN Controller Configuration Guide* for more details on how to to configure your access point.

Follow these steps to change the access point's output power to meet local regulations or special country restrictions using a controller running software release 4.1.x or later:

Step 1 Open your Internet browser. You must use Microsoft Internet Explorer 6.0.2800 or later.

Step 2 Enter **https://IP address** (where *IP address* is the controller's IP address) in the browser address line and press **Enter**. A user login screen appears.

Step 3 Enter the username and password and press **Enter**. The controller's summary page appears.

Note The username and password are case-sensitive.

Step 4 Click **Wireless** on the upper tabs of the screen. The All APs screen appears.

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Step 5 On the left side of the screen under Access Points, click **802.11a Radios** or **802.11b/g Radios** and a list of accociated access points appears.

Step 6 Choose the desired access point from the displayed list and click **Configure** from the drop down arrow. The radio settings page appears.

Step 7 Scroll down to the Tx Power Level Assignment field, and click **Custom**.

Custom—indicates that the radio output power is manually controlled by the Tx Power Configuration setting field.

Step 8 In the Tx Power Level field, select the appropriate power level setting (1 to 5).

Based on the operating channel, the regulatory domain, and the controller power level setting (1 to 5), the actual transmit power at the access point can be reduced to comply with special regulatory or country restrictions.

Note Table 1-1, Table 1-2, Table 1-3, and Table 1-4 lists the access point maximum output power levels supported for its regultory domain when shipped from the factory.

Table 1-6 lists the controller power settings and the corresponding output power levels for two examples:

- 2.4 GHz (802.11b/g) operation:
  - Non-FCC (–N) regulatory domain
  - Channel 2 using 11 Mbps data rates
- 5 GHz (802.11a) operation:
  - Non-FCC (–N) regulatory domain
  - Channel 36 using 36 Mbps data rates

Table 1-6 Example of Output Power Levels

Controller Tx Power Settings[1]	Radio Output Power	
	802.11b/g (dBm)	802.11a (dBm)
1 (maximum)	20[2]	15[3]
2	17	12
3	14	9
4	11	6
5	8	3

1. The Tx Power Level setting of 1 represents the maximum conducted power setting for the access point. Each subsequent controller power level (such as 2, 3, 4, etc) represents approximately a 3-dBm reduction in transmit power from the previous power level.
2. The maximum output power level obtained from Table 1-2.
3. The maximum output power level obtained from Table 1-4.

Step 9 Click **Apply**.

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Step 10 Close your Internet browser.

For additional configuration information, refer to the *Cisco Wireless LAN Controller Configuration Guide*.

CHAPTER 2

Cisco Aironet 1100 Series Access Points

This chapter lists the 1100 series lightweight (AIR-LAP1121G) access point IEEE 802.11b (2.4-GHz) and IEEE 802.11g (2.4-GHz) channels and the maximum power levels supported by the world's regulatory domains. For additional product hardware information refer to the *Cisco Aironet 1100 Series Access Point Hardware Installation Guide.*

The following topics are covered in this chapter:

- Channels, page 2-10
- Maximum Power Levels, page 2-11
- Changing the Lightweight Access Point Output Power, page 2-12

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Channels

AIR-LAP1121G IEEE 802.11g (2.4-GHz Band)

The channel identifiers, channel center frequencies, and regulatory domains of each IEEE 802.11g 22-MHz-wide channel are shown in Table 2-2.

Table 2-1 Channels for IEEE 802.11g

Channel Identifier	Center Frequency (MHz)	Regulatory Domains					
		Americas (-A)		EMEA (-E)		Japan (-J)	
		CCK	OFDM	CCK	OFDM	CCK	OFDM
1	2412	X	X	X	X	X	X
2	2417	X	X	X	X	X	X
3	2422	X	X	X	X	X	X
4	2427	X	X	X	X	X	X
5	2432	X	X	X	X	X	X
6	2437	X	X	X	X	X	X
7	2442	X	X	X	X	X	X
8	2447	X	X	X	X	X	X
9	2452	X	X	X	X	X	X
10	2457	X	X	X	X	X	X
11	2462	X	X	X	X	X	X
12	2467	–	–	X	X	X	X
13	2472	–	–	X	X	X	X
14	2484	–	–	–	–	X	–

Note Mexico is included in the Americas (-A) regulatory domain; however, channels 1 through 8 are for indoor use only while channels 9 through 11 can be used indoors and outdoors. Users are responsible for ensuring that the channel set configuration is in compliance with the regulatory standards of Mexico.

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Maximum Power Levels

IEEE 802.11b (2.4-GHz Band)

An improper combination of power level and antenna gain can result in equivalent isotropic radiated power (EIRP) above the amount allowed per regulatory domain. Table 2-2 indicates the maximum power levels allowed with the Cisco integrated antenna for each IEEE 802.11b regulatory domain.

Table 2-2 Maximum Power Levels Per Antenna Gain for IEEE 802.11b

Regulatory Domain	Antenna Gain (dBi)	Maximum Power Level (mW)
Americas (-A) (4 watts EIRP maximum)	2.2	100
EMEA (-E) (100 mW EIRP maximum)	2.2	50
Japan (-J) (10 mW/MHz EIRP maximum)	2.2	30

IEEE 802.11g (2.4-GHz Band)

An improper combination of power level and antenna gain can result in equivalent isotropic radiated power (EIRP) above the amount allowed per regulatory domain. Table 2-3 shows the maximum power levels allowed with the Cisco integrated antenna for each IEEE 802.11g regulatory domain.

Table 2-3 Maximum Power Levels Per Antenna Gain for IEEE 802.11g

Regulatory Domain	Antenna Gain (dBi)	Maximum Power Level (mW)	
		CCK	OFDM
Americas (-A) (4 watts EIRP maximum)	2.2	100	30
EMEA (-E) (100 mW EIRP maximum)	2.2	50	30
Japan (-J) (10 mW/MHz EIRP maximum)	2.2	30	30

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Changing the Lightweight Access Point Output Power

This section provides instructions for changing the 1100 series lightweight access point output power to comply with the maximum power limits imposed by regulatory domains (see the "Maximum Power Levels" section on page 2-11). Follow these instructions to change the output power settings using your browser:

Note Administrator privileges may be required in order to change access point settings.

Note Regulatory domains are set at the factory and cannot be changed by the user.

The output power on the AIR-LAP1121G-x-K9 (where *x* is the regulatory domain) access points can be changed only by using a Cisco wireless LAN controller (2600 series or 4400 series), the controllers on a Cisco Wireless Services Module (WiSM), or using Cisco Wireless Control System (WCS).

Note See the *Cisco Wireless LAN Controller Configuration Guide* for more details on how to configure your access point using the web-browser interface.

Follow these steps to change theAIR-LAP1121G-x-K9 (where *x* is the regulatory domain) access point's output power to meet local regulations using a controller:

Step 1 Open your Internet browser. You must use Microsoft Internet Explorer 6.0.2800 or a later release.

Step 2 Enter **https://IP address** (where *IP address* is the controller's IP address) in the browser address line and press **Enter**. A user login screen appears.

Step 3 Enter the username and password and press **Enter**. The controller's summary page appears.

Note The username and password are case-sensitive.

Step 4 Click **Wireless** > **802.11b/g Radio** and a list of associated access points appears.

Step 5 Choose the desired access point from the displayed list and click **Configure**. The radio settings page appears.

Step 6 Scroll down to the Tx Power Level Assignment field, and click **Custom**. Custom indicates that the radio output power is manually controlled by the Tx Power Configuration setting field.

Step 7 In the Tx Power Level field, select the appropriate power level setting (1 to 8).

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Table 2-4 lists the controller power settings and the corresponding output power levels for this example:

- 2.4-GHz (802.11b/g) operation:
  - EMEA (–E) regulatory domain

Table 2-4 Available Output Power Levels

Controller Tx Power Settings[1]	Radio Output Power	
	802.11b (mW)	802.11g (mW)
1 (maximum)[2]	50	30
2	25	15
3	12	8
4	6	4
5	3	2
6	2	1
7	-1	–
8		–

1. The Tx Power Level setting of 1 represents the maximum conducted power setting for the access point. Each subsequent power level (such as 2, 3, 4, etc.) represents an approximate 3-dBm reduction in transmit power from the previous power level.
2. See Table 2-3 for the maximum power levels in the –E regulatory domain.

Step 8 Click **Apply**.

Step 9 Close your Internet browser.

For additional configuration information, refer to the *Cisco Wireless LAN Controller Configuration Guide*.

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CHAPTER 3

Cisco Aironet 1130 Series Access Points

This chapter lists the 1130 series lightweight access point (models: AIR-LAP1131G-x-K9 and AIR-LAP1131AG-x-K9) IEEE 802.11b/g (2.4-GHz) and the IEEE 802.11a (5-GHz) channels and maximum power levels supported by the world's regulatory domains. For additional product hardware information refer to the *Cisco Aironet 1130AG Series Access Point Hardware Installation Guide*.

The following topics are covered in this chapter:

- Channels and Maximum Power Levels, page 3-3
- Special Country Restrictions, page 3-5
- Changing the Lightweight Access Point Output Power, page 3-5

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IEEE 802.11b/g (2.4-GHz Band)

When shipped from the factory, the AIR-LAP1131G-x-K9 (single radio) access points support the channels and maximum power levels listed in Table 3-1 for their regulatory domain.

Note The B columns indicate IEEE 802.11b data rates and the G colums indicate IEEE 802.11g data rates.

Table 3-1 Channels and Maximum Conducted Power for the 802.11g Radio ' with 3-dBi Integrated Antenna

Channel Id	Center Freq (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains					
		–A		–E		–P	
		B	G	B	G	B	G
1	2412	20	17	14	14	14	14
2	2417	20	17	14	14	14	14
3	2422	20	17	14	14	14	14
4	2427	20	17	14	14	14	14
5	2432	20	17	14	14	14	14
6	2437	20	17	14	14	14	14
7	2442	20	17	14	14	14	14
8	2447	20	17	14	14	14	14
9	2452	20	17	14	14	14	14
10	2457	20	17	14	14	14	14
11	2462	20	17	14	14	14	14
12	2467	–	–	14	14	14	14
13	2472	–	–	14	14	14	14
14	2484	–	–	–	–	14	–

Channels and Maximum Power Levels

IEEE 802.11b/g (2.4-GHz Band)

When shipped from the factory, the AIR-AP1131AG-x-K9 (dual radio) access points support the channels and maximum power levels listed in Table 3-2 for their regulatory domain.

Note The B columns indicate IEEE 802.11b data rates and the G colums indicate IEEE 802.11g data rates .

Table 3-2 Channels and Maximum Conducted Power for the 802.11b/g Radio with 3-dBi Integrated Antenna

Channel Id	Center Freq (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains																					
		–A		–C		–E		–I		–J		–K		–N		–P		–Q		–S		–T	
		B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G
1	2412	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	14	14	20	17
2	2417	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	14	14	20	17
3	2422	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	14	14	20	17
4	2427	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	14	14	20	17
5	2432	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	14	14	20	17
6	2437	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	14	14	20	17
7	2442	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	14	14	20	17
8	2447	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	14	14	20	17
9	2452	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	14	14	20	17
10	2457	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	14	14	20	17
11	2462	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	14	14	20	17
12	2467	–	–	14	14	14	14	14	14	14	14	14	14	–	–	14	14	14	14	14	14	–	–
13	2472	–	–	14	14	14	14	14	14	14	14	14	14	–	–	14	14	14	14	14	14	–	–
14	2484	–	–	–	–	–	–	–	–	14	–	–	–	–	–	14	–	14	–	–	–	–	–

IEEE 802.11a (5-GHz Band)

When shipped from the factory, the AIR-AP1131AG-x-K9 (dual radio) access points support the channels and maximum power levels listed in Table 3-3 for their regulatory domain.

Note Access points with FCC Certification Number (LDK102054) do not support dynamic frequency selection (DFS) on channels 100 to 140 in the US, Canada, and the Philippines. The FCC Certification Number (also called FCC ID number) is shown on the product label on the bottom of the unit. Only access points with LDK102054E on the product label and running the 4.1.170.0 software release can support DFS in the US, Canada, and the Philippines.

Table 3-3 Channels and Maximum Conducted Power for IEEE 802.11a Radio with 4.5-dBI Integrated Antenna

Channel ID	Center Freq (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains											
		–A	–C	–E	–I	–J	–K	–N	–P	–Q	–U	–S	–T
5150 to 5250 MHz													
34	5170	–	–	–	–	15	–	–	–	–	–	–	–
36	5180	15	–	17	17	–	15	15	15	15	15	17	–
38	5190	–	–	–	–	15	–	–	–	–	–	–	–
40	5200	15	–	17	17	–	15	15	15	15	15	17	–
42	5210	–	–	–	–	15	–	–	–	–	–	–	–
44	5220	15	–	17	17	–	15	15	15	15	15	17	–
46	5230	–	–	–	–	15	–	–	–	–	–	–	–
48	5240	15	–	17	17	–	15	15	15	15	15	17	–
5250 to 5350 MHz													
52	5260	17	–	17[1]	17[1]	–	17[1]	17[1]	15[1]	15[1]	–	14[1]	–
56	5280	17	–	17[1]	17[1]	–	17[1]	17[1]	15[1]	15[1]	–	14[1]	15
60	5300	17	–	17[1]	17[1]	–	17[1]	17[1]	15[1]	15[1]	–	14[1]	15
64	5320	17	–	17[1]	17[1]	–	17[1]	17[1]	15[1]	15[1]	–	14[1]	15
5450 to 5725 MHz													
100	5500	17[1]	–	17[1]	–	–	17[1]	–	–	17[1]	–	–	17[1]
104	5520	17[1]	–	17[1]	–	–	17[1]	–	–	17[1]	–	–	17[1]
108	5540	17[1]	–	17[1]	–	–	17[1]	–	–	17[1]	–	–	17[1]
112	5560	17[1]	–	17[1]	–	–	17[1]	–	–	17[1]	–	–	17[1]
116	5580	17[1]	–	17[1]	–	–	17[1]	–	–	17[1]	–	–	17[1]
120	5600	–	–	17[1]	–	–	17[1]	–	–	17[1]	–	–	17[1]
124	5620	–	–	17[1]	–	–	17[1]	–	–	17[1]	–	–	17[1]
128	5640	–	–	17[1]	–	–	–	–	–	17[1]	–	–	17[1]
132	5660	17[1]	–	17[1]	–	–	–	–	–	17[1]	–	–	17[1]
136	5680	17[1]	–	17[1]	–	–	–	–	–	17[1]	–	–	17[1]
140	5700	17[1]	–	17[1]	–	–	–	–	–	17[1]	–	–	17[1]
5725 to 5850 MHz													
149	5745	17	17	–	–	–	17	17	–	–	–	17	17
153	5765	17	17	–	–	–	17	17	–	–	–	17	17
157	5785	17	17	–	–	–	17	17	–	–	–	17	17
161	5805	17	17	–	–	–	17	17	–	–	–	17	17
165	5825	–	–	–	–	–	–	–	–	–	–	–	–

1. Frequencies require DFS (Uniform spreading not required for the –P regulatory domain).

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Special Country Restrictions

Table 3-4 lists special restrictions for wireless operation in some countries.

Table 3-4 Special Country Restrictions for Wireless Operation

Country	Frequency Band (GHz)	Regulatory Domain	Special Limitation and Restrictions
Mexico	2.4	–N	End user must limit 2.4 GHz operation to 2450 to 2483.5 MHz and 36 dBm EIRP[1].
Russian Federation	5	–E	End user must limit 5 GHz operation to 5650 to 5725 MHz.
United States	5	–A	Operation limited to indoor use only from 5150-5250 MHz.

1. EIRP (dBm) = maximum output power (dBm) + antenna gain (dBi)

Changing the Lightweight Access Point Output Power

This section provides instructions for changing the 1130AG series access point output power to comply with the maximum power limits imposed by special regulatory and country restrictions (see the "Special Country Restrictions" section on page 3-5). Follow these instructions to change the output power settings using a controller and your browser:

Note Administrator privileges may be required in order to change access point settings.

Note Regulatory domains are set at the factory and cannot be changed by the user.

Caution To meet regulatory restrictions, the access point and the external antenna must be professionally installed. The network administration or other IT professional responsible for installing and configuring the unit is a suitable professional installer. Following installation, access to the unit should be password protected by the network administrator to maintain regulatory compliance.

The output power on the access points can be changed only using a Cisco wireless LAN controller (2600 series or 4400 series), the controllers on a Cisco Wireless Services Module (WiSM), or using Cisco Wireless Control System (WCS).

Note See the *Cisco Wireless LAN Controller Configuration Guide* for more details on how to to configure your access point using the web-browser interface.

Follow these steps to change the access point's output power to meet local regulations using a controller:

Step 1 Open your Internet browser. You must use Microsoft Internet Explorer 6.0.2800 or a later release.

Step 2 Enter **https://***IP address* (where *IP address* is the controller's IP address) in the browser address line and press **Enter**. A user login screen appears.

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Step 3 Enter the username and password and press **Enter**. The controller's summary page appears.

Note The username and password are case-sensitive.

Step 4 Click **Wireless** > **802.11a Radios** or **802.11b/g Radios** and a list of associated access points displays.

Step 5 Choose the desired access point from the displayed list and click **Configure**. The radio settings page displays.

Step 6 Scroll down to the Tx Power Level Assignment field, and click **Custom**.

Custom indicates that the radio output power is manually controlled by the Tx Power Configuration setting field.

Step 7 In the Tx Power Level field, select the appropriate power level setting (1 to 8).

Based on the operating channel, the regulatory domain, and the controller power level setting (1 to 8), the actual transmit power at the access point can be reduced to comply with special regulatory or country restrictions.

Table 3-5 lists the controller power settings and the corresponding output power levels for these two examples:

- 2.4 GHz (802.11b/g) operation:
  - American regulatory domain and channel 2 using 11 Mbps data rates
- 5 GHz (802.11a) operation:
  - American regulatory domain and channel 149 using 36 Mbps data rates

Table 3-5 Example of Output Power Levels

Controller Tx Power Settings[1]	Radio Output Power	
	802.11b/g (dBm)	802.11a (dBm)
1 (maximum)	20[2]	17[3]
2	17	14
3	14	11
4	11	8
5	8	5
6	5	2
7	2	-1
8	-1	–

1. The Tx Power Level setting of 1 represents the maximum conducted power setting for the access point. Each subsequent controller power level (such as 2, 3, 4, etc) represents approximately a 3-dBm reduction in transmit power from the previous power level.
2. The maximum output power level obtained from Table 3-2.
3. The maximum output power level obtained from Table 3-3.

Step 8 Click **Apply**.

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Step 9 Close your Internet browser.

For additional configuration information, refer to the *Cisco Wireless LAN Controller Configuration Guide*.

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CHAPTER 4

Cisco Aironet 1140 Series Lightweight Access Points

This section lists the 1140 series lightweight access points (model: AIR-LAP1141) 2.4-GHz and 5-GHz (IEEE 802.11n Draft 2.0) radio channels and maximum power levels supported by the world's regulatory domains. The following topics are covered in this section:

- Channels and Maximum Power Levels, page 4-2
- Special Country Restrictions, page 4-18
- Changing Lightweight Access Point Output Power, page 4-18

Channels and Maximum Power Levels

2.4-GHz Band Maximum Power Levels

Table 4-1 indicates the maximum power levels for the 802.11b/g/n standard for the 2.4-GHz radio.

Table 4-1 802.11 b/g/n 2.4-GHz Maximum Transmit Power

IEEE Standards					TX Power Out (dBm)	Antenna & Transmitter Operation
802.11	BW (MHz)	IEEE	Data Rates	Notes	Tx1+Tx2=Total	Notes
B	20	CCK	1 to 11 Mbps	CCK Modes	20 + 0 = 20	**Tx Diversity—** Only one transmitter on at a time; both antennas used.
G	20	non HT-20	6 to 54 Mbps	Legacy, OFDM Modes	17 + 17 = 20	**Dual antennas—** Both transmitters on simultaneously using CSD of 50 ns.
N	20	Ht-20	MCS0 to 15	MIMO Modes	17 + 17 = 20	**Dual antennas—** Both transmitters on simultaneously using CSD of 400 ns.
N	40	HT-40	MCS0 to 15	MIMO Modes	17 + 17 = 20	**Dual antennas—** Both transmitters on simultaneously using CSD of 400 ns.
N	40	non HT-40 (duplicate)	6 to 54 Mbps	Duplicate Mode	17 + 17 = 20	**Dual antennas—** Both transmitters on simultaneously using CSD of 50 ns.
N	40	Beamforming (legacy clients)	6 to 54 Mbps	Legacy, OFDM Beamforming Modes	17 + 17 = 20	**Dual antennas—** Both transmitters on simultaneously using using phase adjustment for beamforming.

Tables 4-2 through 4-4 show 2.4-GHz b/g/n radio maximum power levels for the -A (America), -E (ETSI), and -P (Japan) regulatory domains.

2.4-GHz Maximum Power Levels per Regulatory Domains

Table 4-2 2.4-GHz Channels and Maximum Conducted Power in the –A (America) Regulatory Domain

			HW Group 4 CCK Tx diversity Single Antenna 1 to 11 Mbps			HW Group 1 Non HT20 Single Antenna 6 to 54 Mbps			HW Group 1 Non HT40 Duplicate Signle Antenna 6 to 54 Mbps			HW Group 3 HT20 Dual Antennas M0 to M15			HW Group 3 HT40 Dual Antennas M0 to M15		
BW MHz	Freq (MHz)	CH id	Tx 1	Tx 2	Total Power	Tx 1	Tx 2	Total Power	Tx 1	Tx 2	Total Power	Tx 1	Tx 2	Total Power	Tx 1	Tx 2	Total Power
20	2412	1	20	OFF	20	17	OFF	17	17	17	20	14	14	17	–	–	–
20	2417	2	20	OFF	20	17	OFF	17	17	17	20	14	14	17	–	–	–
20	2422	3	20	OFF	20	17	OFF	17	17	17	20	14	14	17	–	–	–
20	2427	4	20	OFF	20	17	OFF	17	17	17	20	14	14	17	–	–	–
20	2432	5	20	OFF	20	17	OFF	17	17	17	20	14	14	17	–	–	–
20	2437	6	23	OFF	23	20	OFF	20	17	17	20	17	17	20	–	–	–
20	2442	7	20	OFF	20	17	OFF	17	17	17	20	14	14	17	–	–	–
20	2447	8	20	OFF	20	17	OFF	17	17	17	20	14	14	17	–	–	–
20	2452	9	20	OFF	20	17	OFF	17	17	17	20	14	14	17	–	–	–
20	2457	10	20	OFF	20	17	OFF	17	17	17	20	14	14	17	–	–	–
20	2462	11	20	OFF	20	17	OFF	17	17	17	20	14	14	17	–	–	–
40	2412 & 2432	1, 5U or 5, 1L	–	–	–	–	–	–	16	Off	16				11	11	14
40	2412 & 2437	2, 6U, or 6, 2L	–	–	–	–	–	–	16	Off	16	–	–	–	13	13	16
40	2422 & 2442	3, 7U, or 7, 3L	–	–	–	–	–	–	14	Off	14	–	–	–	11	11	14
40	2427 & 2447	4, 8U, or 8, 4L	–	–	–	–	–	–	17	Off	17	–	–	–	14	14	17
40	2432 % 2452	5, 9U, or 9, 5L	–	–	–	–	–	–	16	Off	16	–	–	–	11	11	14
40	2437 & 2457	6, 10U, or 10, 6L	–	–	–	–	–	–	16	Off	16	–	–	–	13	13	16
40	2442 & 2462	7, 11U or 11, 7L	–	–	–	–	–	–	14	Off	14	–	–	–	11	11	14

Table 4-3 2.4-GHz Channels and Maximum Conducted Power in the –E (ETSI) Regulatory Domain

			HW Group 4 CCK Tx diversity Single Antenna 1 to 11 Mbps			HW Group 1 Non HT20 Single Antenna 6 to 54 Mbps			HW Group 1 Non HT40 Duplicate Signle Antenna 6 to 54 Mbps			HW Group 3 HT20 Dual Antennas M0 to M15			HW Group 3 HT40 Dual Antennas M0 to M15		
BW MHz	Freq (MHz)	CH id	Tx 1	Tx 2	Total Power	Tx 1	Tx 2	Total Power	Tx 1	Tx 2	Total Power	Tx 1	Tx 2	Total Power	Tx 1	Tx 2	Total Power
20	2412	1	16	Off	16	16	Off	16	–	–	–	13	13	16	–	–	–
20	2417	2	16	Off	16	16	Off	16	–	–	–	13	13	16	–	–	–
20	2422	3	16	Off	16	16	Off	16	–	–	–	13	13	16	–	–	–
20	2427	4	16	Off	16	16	Off	16	–	–	–	13	13	16	–	–	–
20	2432	5	16	Off	16	16	Off	16	–	–	–	13	13	16	–	–	–
20	2437	6	16	Off	16	16	Off	16	–	–	–	13	13	16	–	–	–
20	2442	7	16	Off	16	16	Off	16	–	–	–	13	13	16	–	–	–
20	2447	8	16	Off	16	16	Off	16	–	–	–	13	13	16	–	–	–
20	2452	9	16	Off	16	16	Off	16	–	–	–	13	13	16	–	–	–
20	2457	10	16	Off	16	16	Off	16	–	–	–	13	13	16	–	–	–
20	2462	11	16	Off	16	16	Off	16	–	–	–	13	13	16	–	–	–
20	2467	12	16	Off	16	16	Off	16	–	–	–	13	13	16	–	–	–
20	2472	13	16	Off	16	16	Off	16	–	–	–	13	13	16	–	–	–
40	2412 & 2432	1, 5U or 5, 1L	–	–	–	–	–	–	16	Off	16	–	–	–	13	13	16
40	2417 & 2437	2, 6U, or 6, 2L	–	–	–	–	–	–	16	Off	16	–	–	–	13	13	16
40	2422 & 2442	3, 7U, or 7, 3L	–	–	–	–	–	–	16	Off	16	–	–	–	13	13	16
40	2427 & 2447	4, 8U, or 8, 4L	–	–	–	–	–	–	16	Off	16	–	–	–	13	13	16
40	2437 & 2457	6, 10U, or 10, 6L	–	–	–	–	–	–	16	Off	16	–	–	–	13	13	16
40	2442 & 2462	7, 11U or 11, 7L	–	–	–	–	–	–	16	Off	16	–	–	–	13	13	16
40	2447 & 2467	8, 12U, or 12, 8L	–	–	–	–	–	–	16	Off	16	–	–	–	13	13	16
40	2452 & 2472	9, 13U or 13, 9L	–	–	–	–	–	–	16	Off	16	–	–	–	13	13	16

Table 4-4 2.4-GHz Channels and Maximum Conducted Power in the –P (Japan) Regulatory Domain

			HW Group 4 CCK Tx diversity Single Antenna 1 to 11 Mbps			HW Group 1 Non HT20 Single Antenna 6 to 54 Mbps			HW Group 1 Non HT40 Duplicate Signle Antenna 6 to 54 Mbps			HW Group 3 HT20 Dual Antennas M0 to M15			HW Group 3 HT40 Dual Antennas M0 to M15		
BW MHz	Freq (MHz)	CH id	Tx 1	Tx 2	Total Power	Tx 1	Tx 2	Total Power	Tx 1	Tx 2	Total Power	Tx 1	Tx 2	Total Power	Tx 1	Tx 2	Total Power
20	2412	1	18	Off	18	17	OFF	17	–	–	–	17	17	20	–	–	–
20	2417	2	18	Off	18	17	OFF	17	–	–	–	17	17	20	–	–	–
20	2422	3	18	Off	18	17	OFF	17	–	–	–	17	17	20	–	–	–
20	2427	4	18	Off	18	17	OFF	17	–	–	–	17	17	20	–	–	–
20	2432	5	18	Off	18	17	OFF	17	–	–	–	17	17	20	–	–	–
20	2437	6	18	Off	18	17	OFF	17	–	–	–	17	17	20	–	–	–
20	2442	7	18	Off	18	17	OFF	17	–	–	–	17	17	20	–	–	–
20	2447	8	18	Off	18	17	OFF	17	–	–	–	17	17	20	–	–	–
20	2452	9	18	Off	18	17	OFF	17	–	–	–	17	17	20	–	–	–
20	2457	10	18	Off	18	17	OFF	17	–	–	–	17	17	20	–	–	–
20	2462	11	18	Off	18	17	OFF	17	–	–	–	17	17	20	–	–	–
20	2467	12	18	Off	18	17	OFF	17	–	–	–	17	17	20	–	–	–
20	2472	13	18	Off	18	17	OFF	17	–	–	–	17	17	20	–	–	–
40	2412 & 2432	1, 5U or 5, 1L	–	–	–	–	–	–	17	Off	17				17	17	20
40	2417 & 2437	2, 6U, or 6, 2L	–	–	–	–	–	–	17	Off	17	–	–	–	17	17	20
40	2422 & 2442	3, 7U, or 7, 3L	–	–	–	–	–	–	17	Off	17	–	–	–	17	17	20
40	2427 & 2447	4, 8U, or 8, 4L	–	–	–	–	–	–	17	Off	17	–	–	–	17	17	20
40	2432 % 2452	5, 9U, or 9, 5L	–	–	–	–	–	–	17	Off	17	–	–	–	17	17	20
40	2437 & 2457	6, 10U, or 10, 6L	–	–	–	–	–	–	17	Off	17	–	–	–	17	17	20
40	2442 & 2462	7, 11U, or 11, 7L	–	–	–	–	–	–	17	Off	17	–	–	–	17	17	20
40	2447 & 2467	8, 12U, or 12, 8L	–	–	–	–	–	–	17	Off	17	–	–	–	17	17	20
40	2452 & 2472	9, 13U, or 13, 9L	–	–	–	–	–	–	17	Off	17	–	–	–	17	17	20

5 GHz Band (IEEE 802.11n Draft 2.0)

Table 4-5 802.11 a/n 5-GHz Maximum Transmit Power

IEEE Standards					TX Power Out (dBm)	Antenna & Transmitter Operation
802.11	BW (MHz)	IEEE	Data Rates	Notes	Tx1+Tx2=Total	Notes
A	20	non HT-20	6 to 54 Mbps	Legacy, OFDM Modes	17 + 17 = 20	**Dual Antennas**—Both transmitters on simultaneously using CSC of 50 ns.
N	20	HT-20	MCS0 to 15	MIMO Modes	17 + 17 = 20	**Dual Antennas**—Both transmitters on simultaneously using CSC of 400 ns.
N	40	HT-40	MCS0 to 15	MIMO Modes	17 + 17 = 20	**Dual Antennas**—Both transmitters on simultaneously using CSC of 400 ns.
N	40	non HT-40 (duplicate)	6 to 54 Mbps	Duplicate Mode	17 + 17 = 20	**Dual Antennas**—Both transmitters on simultaneously using CSC of 50 ns.
N	20	Beamforming (legacy clients)	6 to 54 Mbps	Legacy, OFDM Beamforming Modes	17 + 17 = 20	**Dual Antennas**—Both transmitters on simultaneously using phase adjustment for beamforming.

Tables 4-6 through 4-14 show show 5-GHz a/n radio maximum power levels for the -A (America), -E (ETSI), -C (China), -P (Japan), -I (Israel), -K (South Korea), -N (Non-FCC), -S (Singapore), and -T (Taiwan) regulatory domains.

Table 4-6 5-GHz Channels and Maximum Conducted Power in the –A (America) Regulatory Domain

				HW Group 1 Non HT20 Single Antenna 6 to 54 Mbps			HW Group 1 Non HT40 Duplicate Single Antenna 6 to 54 Mbps			HW Group 2 Non HT20 Dual Antennas M0 to M15			HW Group 1 Non HT20 Dual Antennas M0 to M15		
BW	**Band**	**Freq (MHz)**	**CH id**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**
40	UNII-1	5180 & 5200	36, 40U, or 40, 36L	–	–	–	14	Off	14	–	–	–	14	14	17
40		5220 & 5240	44, 48U, or 48, 44L	–	–	–	14	Off	14	–	–	–	14	14	17
40	UNII-2	5260 & 5280	52, 56U, or 56, 52L	–	–	–	17	Off	17	–	–	–	17	17	20
40		5300 & 5320	60, 64U, or 64, 60L	–	–	–	17	Off	17	–	–	–	14	14	17
40	UNII-2 ext	5500 & 5520	100, 104U, or 104, 100L	–	–	–	17	Off	17	–	–	–	14	14	17
40		5540 & 5560	108, 112U or 112, 108L	–	–	–	17	Off	17	–	–	–	17	17	20
40		5580 & 5600	116, 120U, or 120, 116L	–	–	–	Not allowed			–	–	–	Not allowed		
40		5620 & 5640	124, 128U or 128, 124L	–	–	–	Not allowed			–	–	–	Not allowed		
40		5660 & 5680	132, 136U, or 136, 132L	–	–	–	17	Off	17	–	–	–	17	17	20
40	UNII-3	5475 & 5676	149, 153U, or 153, 149L	–	–	–	17	Off	17	–	–	–	17	17	20
40		5785 & 5805	157, 161U, or 161, 157L	–	–	–	17	Off	17	–	–	–	17	17	20
20	UNII-1	5180	36	14	Off	14	–	–	–	11	11	14	–	–	–
20		5200	40	14	Off	14	–	–	–	11	11	14			
20		5220	44	14	Off	14	–	–	–	11	11	14			
20		5240	48	14	Off	14	–	–	–	11	11	14			
20	UNII-2	5260	52	17	Off	17	–	–	–	17	17	20	–	–	–
20		5280	56	17	Off	17	–	–	–	17	17	20	–	–	–
20		5300	60	17	Off	17	–	–	–	17	17	20	–	–	–
20		5320	64	17	Off	17	–	–	–	16	16	19	–	–	–
20	UNII-2 ext	5500	100	17	Off	17	–	–	–	17	17	20	–	–	–
20		5520	104	17	Off	17	–	–	–	17	17	20	–	–	–
20		5540	108	17	Off	17	–	–	–	17	17	20	–	–	–
20		5560	112	17	Off	17	–	–	–	17	17	20	–	–	–
20		5580	116	17	Off	17	–	–	–	17	17	20	–	–	–
20		5600	120	Not allowed			–	–	–	Not allowed			–	–	–
20		5620	124	Not allowed			–	–	–	Not allowed			–	–	–
20		5640	128	Not allowed			–	–	–	Not allowed			–	–	–
20		5660	132	17	Off	17	–	–	–	17	17	20	–	–	–
20		5680	136	17	Off	17	–	–	–	17	17	20	–	–	–
20		5700	140	17	Off	17	–	–	–	17	17	20	–	–	–
20	UNII-3	5745	149	17	Off	17	–	–	–	17	17	20	–	–	–
20		5765	153	17	Off	17	–	–	–	17	17	20	–	–	–
20		5785	157	17	Off	17	–	–	–	17	17	20	–	–	–
20		5805	161	17	Off	17	–	–	–	17	17	20	–	–	–
20	5.8 ISM	5825	165	17	Off	17	–	–	–	17	17	20	–	–	–

Table 4-7 5-GHz Channels and Maximum Conducted Power in the –E (ETSI) Regulatory Domain

				HW Group 1 Non HT20 Single Antenna 6 to 54 Mbps			HW Group 1 Non HT40 Duplicate Single Antenna 6 to 54 Mbps			HW Group 2 Non HT20 Dual Antennas M0 to M15			HW Group 1 Non HT20 Dual Antennas M0 to M15		
BW	**Band**	**Freq (MHz)**	**CH id**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**
40	UNII-1	5180	36	17	Off	17	–	–	–	16	16	19	–	–	–
40		5200	40	17	Off	17	–	–	–	16	16	19	–	–	–
40		5220	44	17	Off	17	–	–	–	16	16	19	–	–	–
40		5240	48	17	Off	17	–	–	–	16	16	19	–	–	–
40	UNII-2	5260	52	17	Off	17	–	–	–	16	16	19	–	–	–
40		5280	56	17	Off	17	–	–	–	16	16	19	–	–	–
40		5300	60	17	Off	17	–	–	–	16	16	19	–	–	–
40		5320	64	17	Off	17	–	–	–	16	16	19	–	–	–
40	UNII-2 ext	5500	100	17	Off	17	–	–	–	16	16	19	–	–	–
40		5520	104	17	Off	17	–	–	–	16	16	19	–	–	–
40		5540	108	17	Off	17	–	–	–	16	16	19	–	–	–
20		5560	112	17	Off	17	–	–	–	16	16	19	–	–	–
20		5580	116	17	Off	17	–	–	–	16	16	19	–	–	–
20		5600	120	17	Off	17	–	–	–	16	16	19	–	–	–
20		5620	124	17	Off	17	–	–	–	16	16	19	–	–	–
20		5640	128	17	Off	17	–	–	–	16	16	19	–	–	–
20		5660	132	17	Off	17	–	–	–	16	16	19	–	–	–
20		5680	136	17	Off	17	–	–	–	16	16	19	–	–	–
20		5700	140	17	Off	17	–	–	–	16	16	19	–	–	–
20	UNI-3	5745	149	Not allowed			–	–	–	Not allowed			–	–	–
20		5765	153	Not allowed			–	–	–	Not allowed			–	–	–
20		5785	157	Not allowed			–	–	–	Not allowed			–	–	–
20		5805	161	Not allowed			–	–	–	Not allowed			–	–	–
20	5.8 ISM	5825	165	Not allowed			–	–	–	Not allowed			–	–	–
40	UNII-1	5180 & 5200	36, 40u, or 40, 36L	–	–	–	17	Off	17				17	17	20
40		5220 & 5240	44, 48U, or 48, 44L	–	–	–	17	Off	17				17	17	20
40	UNII-2	5260 & 5280	52, 56U, or 56, 52L	–	–	–	17	Off	17				17	17	20
40		5300 & 5320	60, 64U, or 64, 60L	–	–	–	17	Off	17				17	17	20

Table 4-7 5-GHz Channels and Maximum Conducted Power in the –E (ETSI) Regulatory Domain (continued)

				HW Group 1 Non HT20 Single Antenna 6 to 54 Mbps			HW Group 1 Non HT40 Duplicate Single Antenna 6 to 54 Mbps			HW Group 2 Non HT20 Dual Antennas M0 to M15			HW Group 1 Non HT20 Dual Antennas M0 to M15		
BW	**Band**	**Freq (MHz)**	**CH id**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**
40	UNII-2 ext	5500 & 5520	100, 104U, or 104, 100L	–	–	–	17	Off	17				17	17	20
40		5540 & 5560	108, 112U, or 112, 108L	–	–	–	17	Off	17				17	17	20
40		5580 & 5600	116, 120U, or 120, 116L	–	–	–	17	Off	17				17	17	20
40		5620 & 5640	124, 128U, or 128, 124L	–	–	–	17	Off	17				17	17	20
40		5660 & 5680	132, 136U, or 136, 132L	–	–	–	17	Off	17				17	17	20
40	UNI-3	5745 & 5765	149, 153, or 153, 149L	–	–	–	Not allowed						Not allowed		
40		5785 & 5805	157, 161U, or 161, 157L	–	–	–	Not allowed						Not allowed		

Table 4-8 5-GHz Channels and Maximum Conducted Power in the –C (China) Regulatory Domain

				HW Group 1 Non HT20 Single Antenna 6 to 54 Mbps			HW Group 1 Non HT40 Duplicate Single Antenna 6 to 54 Mbps			HW Group 2 Non HT20 Dual Antennas M0 to M15			HW Group 1 Non HT20 Dual Antennas M0 to M15		
BW	**Band**	**Freq (MHz)**	**CH id**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**
40	UNII-1	5180	36	Not allowed			–	–	–	Not allowed			–	–	–
40		5200	40	Not allowed			–	–	–	Not allowed			–	–	–
40		5220	44	Not allowed			–	–	–	Not allowed			–	–	–
40		5240	48	Not allowed			–	–	–	Not allowed			–	–	–
40	UNII-2	5260	52	Not allowed			–	–	–	Not allowed			–	–	–
40		5280	56	Not allowed			–	–	–	Not allowed			–	–	–
40		5300	60	Not allowed			–	–	–	Not allowed			–	–	–
40		5320	64	Not allowed			–	–	–	Not allowed			–	–	–
40	UNII-2 ext	5500	100	Not allowed			–	–	–	Not allowed			–	–	–
40		5520	104	Not allowed			–	–	–	Not allowed			–	–	–
40		5540	108	Not allowed			–	–	–	Not allowed			–	–	–
20		5560	112	Not allowed			–	–	–	Not allowed			–	–	–
20		5580	116	Not allowed			–	–	–	Not allowed			–	–	–
20		5600	120	Not allowed			–	–	–	Not allowed			–	–	–
20		5620	124	Not allowed			–	–	–	Not allowed			–	–	–
20		5640	128	Not allowed			–	–	–	Not allowed			–	–	–
20		5660	132	Not allowed			–	–	–	Not allowed			–	–	–
20		5680	136	Not allowed			–	–	–	Not allowed			–	–	–
20		5700	140	Not allowed			–	–	–	Not allowed			–	–	–
20	UNI-3	5745	149	17	Off	17	–	–	–	17	17	20	–	–	–
20		5765	153	17	Off	17	–	–	–	17	17	20	–	–	–
20		5785	157	17	Off	17	–	–	–	17	17	20	–	–	–
20		5805	161	17	Off	17	–	–	–	17	17	20	–	–	–
20	5.8 ISM	5825	165	17	Off	17	–	–	–	17	17	20	–	–	–
40	UNII-1	5180 & 5200	36, 40u, or 40, 36L	–	–	–	Not allowed						Not allowed		
40		5220 & 5240	44, 48U, or 48, 44L	–	–	–	Not allowed						Not allowed		
40	UNII-2	5260 & 5280	52, 56U, or 56, 52L	–	–	–	Not allowed						Not allowed		
40		5300 & 5320	60, 64U, or 64, 60L	–	–	–	Not allowed			17	17	20	Not allowed		

Table 4-8 5-GHz Channels and Maximum Conducted Power in the –C (China) Regulatory Domain (continued)

				HW Group 1 Non HT20 Single Antenna 6 to 54 Mbps			HW Group 1 Non HT40 Duplicate Single Antenna 6 to 54 Mbps			HW Group 2 Non HT20 Dual Antennas M0 to M15			HW Group 1 Non HT20 Dual Antennas M0 to M15		
BW	**Band**	**Freq (MHz)**	**CH id**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**
40	UNII-2 ext	5500 & 5520	100, 104U, or 104, 100L	–	–	–	Not allowed			17	17	20	Not allowed		
40		5540 & 5560	108, 112U, or 112, 108L	–	–	–	Not allowed			17	17	20	Not allowed		
40		5580 & 5600	116, 120U, or 120, 116L	–	–	–	Not allowed			17	17	20	Not allowed		
40		5620 & 5640	124, 128U, or 128, 124L	–	–	–	Not allowed			17	17	20	Not allowed		
40		5660 & 5680	132, 136U, or 136, 132L	–	–	–	Not allowed			17	17	20	Not allowed		
40	UNI-3	5745 & 5765	149, 153, or 153, 149L	–	–	–	17	Off	17	–	–	–	17	17	20
40		5785 & 5805	157, 161U, or 161, 157L	–	–	–	17	Off	17	–	–	–	17	17	20

Table 4-9 5-GHz Channels and Maximum Conducted Power in the –P (Japan) Regulatory Domain

				HW Group 1 Non HT20 Single Antenna 6 to 54 Mbps			HW Group 1 Non HT40 Duplicate Single Antenna 6 to 54 Mbps			HW Group 2 Non HT20 Dual Antennas M0 to M15			HW Group 1 Non HT20 Dual Antennas M0 to M15		
BW	**Band**	**Freq (MHz)**	**CH id**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**
40	UNII-1	5180	36	17	Off	17	–	–	–	16	16	19	–	–	–
40		5200	40	17	Off	17	–	–	–	16	16	19	–	–	–
40		5220	44	17	Off	17	–	–	–	16	16	19	–	–	–
40		5240	48	17	Off	17	–	–	–	16	16	19	–	–	–
40	UNII-2	5260	52	14	Off	14	–	–	–	11	11	14	–	–	–
40		5280	56	14	Off	14	–	–	–	11	11	14	–	–	–
40		5300	60	14	Off	14	–	–	–	11	11	14	–	–	–
40		5320	64	14	Off	14	–	–	–	11	11	14	–	–	–
40	UNII-2 ext	5500	100	Not allowed			–	–	–	Not allowed			–	–	–
40		5520	104	Not allowed			–	–	–	Not allowed			–	–	–
40		5540	108	Not allowed			–	–	–	Not allowed			–	–	–
20		5560	112	Not allowed			–	–	–	Not allowed			–	–	–
20		5580	116	Not allowed			–	–	–	Not allowed			–	–	–
20		5600	120	Not allowed			–	–	–	Not allowed			–	–	–
20		5620	124	Not allowed			–	–	–	Not allowed			–	–	–
20		5640	128	Not allowed			–	–	–	Not allowed			–	–	–
20		5660	132	Not allowed			–	–	–	Not allowed			–	–	–
20		5680	136	Not allowed			–	–	–	Not allowed			–	–	–
20		5700	140	Not allowed			–	–	–	Not allowed			–	–	–
20	UNI-3	5745	149	Not allowed			–	–	–	Not allowed			–	–	–
20		5765	153	Not allowed			–	–	–	Not allowed			–	–	–
20		5785	157	Not allowed			–	–	–	Not allowed			–	–	–
20		5805	161	Not allowed			–	–	–	Not allowed			–	–	–
20	5.8 ISM	5825	165	Not allowed			–	–	–	Not allowed			–	–	–
40	UNII-1	5180 & 5200	36, 40u, or 40, 36L	–	–	–	17	Off	17	–	–	–	14	14	17
40		5220 & 5240	44, 48U, or 48, 44L	–	–	–	17	Off	17	–	–	–	14	14	17
40	UNII-2	5260 & 5280	52, 56U, or 56, 52L	–	–	–	17	Off	17	–	–	–	14	14	17
40		5300 & 5320	60, 64U, or 64, 60L	–	–	–	17	Off	17	–	–	–	14	14	17
40	UNII-2 ext	5500 & 5520	100, 104U, or 104, 100L	–	–	–	Not allowed						Not allowed		
40		5540 & 5560	108, 112U, or 112, 108L	–	–	–	Not allowed						Not allowed		
40		5580 & 5600	116, 120U, or 120, 116L	–	–	–	Not allowed						Not allowed		
40		5620 & 5640	124, 128U, or 128, 124L	–	–	–	Not allowed						Not allowed		
40		5660 & 5680	132, 136U, or 136, 132L	–	–	–	Not allowed						Not allowed		
40	UNI-3	5745 & 5765	149, 153, or 153, 149L	–	–	–	Not allowed						Not allowed		
40		5785 & 5805	157, 161U, or 161, 157L	–	–	–	Not allowed						Not allowed		

Table 4-10 5-GHz Channels and Maximum Conducted Power in the –I (Israel) Regulatory Domain

				HW Group 1 Non HT20 Single Antenna 6 to 54 Mbps			HW Group 1 Non HT40 Duplicate Single Antenna 6 to 54 Mbps			HW Group 2 Non HT20 Dual Antennas M0 to M15			HW Group 1 Non HT20 Dual Antennas M0 to M15		
BW	**Band**	**Freq (MHz)**	**CH id**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**
40	UNII-1	5180	36	17	Off	17	–	–	–	16	16	19	–	–	–
40		5200	40	17	Off	17	–	–	–	16	16	19	–	–	–
40		5220	44	17	Off	17	–	–	–	16	16	19	–	–	–
40		5240	48	17	Off	17	–	–	–	16	16	19	–	–	–
40	UNII-2	5260	52	17	Off	17	–	–	–	16	16	19	–	–	–
40		5280	56	17	Off	17	–	–	–	16	16	19	–	–	–
40		5300	60	17	Off	17	–	–	–	16	16	19	–	–	–
40		5320	64	17	Off	17	–	–	–	16	16	19	–	–	–
40	UNII-2 ext	5500	100	Not allowed			–	–	–	Not allowed			–	–	–
40		5520	104	Not allowed			–	–	–	Not allowed			–	–	–
40		5540	108	Not allowed			–	–	–	Not allowed			–	–	–
20		5560	112	Not allowed			–	–	–	Not allowed			–	–	–
20		5580	116	Not allowed			–	–	–	Not allowed			–	–	–
20		5600	120	Not allowed			–	–	–	Not allowed			–	–	–
20		5620	124	Not allowed			–	–	–	Not allowed			–	–	–
20		5640	128	Not allowed			–	–	–	Not allowed			–	–	–
20		5660	132	Not allowed			–	–	–	Not allowed			–	–	–
20		5680	136	Not allowed			–	–	–	Not allowed			–	–	–
20		5700	140	Not allowed			–	–	–	Not allowed			–	–	–
20	UNI-3	5745	149	Not allowed			–	–	–	Not allowed			–	–	–
20		5765	153	Not allowed			–	–	–	Not allowed			–	–	–
20		5785	157	Not allowed			–	–	–	Not allowed			–	–	–
20		5805	161	Not allowed			–	–	–	Not allowed			–	–	–
20	5.8 ISM	5825	165	Not allowed			–	–	–	Not allowed			–	–	–
40	UNII-1	5180 & 5200	36, 40u, or 40, 36L	–	–	–	17	Off	17	–	–	–	14	14	17
40		5220 & 5240	44, 48U, or 48, 44L	–	–	–	17	Off	17	–	–	–	14	14	17
40	UNII-2	5260 & 5280	52, 56U, or 56, 52L	–	–	–	17	Off	17	–	–	–	14	14	17
40		5300 & 5320	60, 64U, or 64, 60L	–	–	–	17	Off	17	–	–	–	14	14	17
40	UNII-2 ext	5500 & 5520	100, 104U, or 104, 100L	–	–	–	Not allowed						Not allowed		
40		5540 & 5560	108, 112U, or 112, 108L	–	–	–	Not allowed						Not allowed		
40		5580 & 5600	116, 120U, or 120, 116L	–	–	–	Not allowed						Not allowed		
40		5620 & 5640	124, 128U, or 128, 124L	–	–	–	Not allowed						Not allowed		
40		5660 & 5680	132, 136U, or 136, 132L	–	–	–	Not allowed						Not allowed		
40	UNI-3	5745 & 5765	149, 153, or 153, 149L	–	–	–	Not allowed						Not allowed		
40		5785 & 5805	157, 161U, or 161, 157L	–	–	–	Not allowed						Not allowed		

Table 4-11 5-GHz Channels and Maximum Conducted Power in the –K (South Korea) Regulatory Domain

				HW Group 1 Non HT20 Single Antenna 6 to 54 Mbps			HW Group 1 Non HT40 Duplicate Single Antenna 6 to 54 Mbps			HW Group 2 Non HT20 Dual Antennas M0 to M15			HW Group 1 Non HT20 Dual Antennas M0 to M15		
BW	**Band**	**Freq (MHz)**	**CH id**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**
40	UNII-1	5180	36	17	Off	17	–	–	–	13	13	16	–	–	–
40		5200	40	17	Off	17	–	–	–	13	13	16	–	–	–
40		5220	44	17	Off	17	–	–	–	13	13	16	–	–	–
40		5240	48	17	Off	17	–	–	–	13	13	16	–	–	–
40	UNII-2	5260	52	17	Off	17	–	–	–	17	17	20	–	–	–
40		5280	56	17	Off	17	–	–	–	17	17	20	–	–	–
40		5300	60	17	Off	17	–	–	–	17	17	20	–	–	–
40		5320	64	17	Off	17	–	–	–	17	17	20	–	–	–
40	UNII-2 ext	5500	100	17	Off	17	–	–	–	17	17	20	–	–	–
40		5520	104	17	Off	17	–	–	–	17	17	20	–	–	–
40		5540	108	17	Off	17	–	–	–	17	17	20	–	–	–
20		5560	112	17	Off	17	–	–	–	17	17	20	–	–	–
20		5580	116	17	Off	17	–	–	–	17	17	20	–	–	–
20		5600	120	17	Off	17	–	–	–	17	17	20	–	–	–
20		5620	124	17	Off	17	–	–	–	17	17	20	–	–	–
20		5640	128	Not allowed			–	–	–	Not allowed			–	–	–
20		5660	132	Not allowed			–	–	–	Not allowed			–	–	–
20		5680	136	Not allowed			–	–	–	Not allowed			–	–	–
20		5700	140	Not allowed			–	–	–	Not allowed			–	–	–
20	UNI-3	5745	149	17	Off	17	–	–	–	17	17	20	–	–	–
20		5765	153	17	Off	17	–	–	–	17	17	20	–	–	–
20		5785	157	17	Off	17	–	–	–	17	17	20	–	–	–
20		5805	161	17	Off	17	–	–	–	17	17	20	–	–	–
20	5.8 ISM	5825	165	Not allowed			–	–	–	Not allowed			–	–	–
40	UNII-1	5180 & 5200	36, 40u, or 40, 36L	–	–	–	17	Off	17	–	–	–	16	16	19
40		5220 & 5240	44, 48U, or 48, 44L	–	–	–	17	Off	17	–	–	–	16	16	19
40	UNII-2	5260 & 5280	52, 56U, or 56, 52L	–	–	–	17	Off	17	–	–	–	17	17	20
40		5300 & 5320	60, 64U, or 64, 60L	–	–	–	17	Off	17	–	–	–	17	17	20
40	UNII-2 ext	5500 & 5520	100, 104U, or 104, 100L	–	–	–	17	Off	17	–	–	–	17	17	20
40		5540 & 5560	108, 112U, or 112, 108L	–	–	–	17	Off	17	–	–	–	17	17	20
40		5580 & 5600	116, 120U, or 120, 116L	–	–	–	17	Off	17	–	–	–	17	17	20
40		5620 & 5640	124, 128U, or 128, 124L	–	–	–	Not allowed			–	–	–	Not allowed		
40		5660 & 5680	132, 136U, or 136, 132L	–	–	–	Not allowed			–	–	–	Not allowed		
40	UNI-3	5745 & 5765	149, 153, or 153, 149L	–	–	–	17	Off	17	–	–	–	17	17	20
40		5785 & 5805	157, 161U, or 161, 157L	–	–	–	17	Off	17	–	–	–	17	17	20

Table 4-12 5-GHz Channels and Maximum Conducted Power in the –N (Non FCC) Regulatory Domain

				HW Group 1 Non HT20 Single Antenna 6 to 54 Mbps			HW Group 1 Non HT40 Duplicate Single Antenna 6 to 54 Mbps			HW Group 2 Non HT20 Dual Antennas M0 to M15			HW Group 1 Non HT20 Dual Antennas M0 to M15		
BW	**Band**	**Freq (MHz)**	**CH id**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**
40	UNII-1	5180	36	14	Off	14	–	–	–	11	11	14	–	–	–
40		5200	40	14	Off	14	–	–	–	11	11	14	–	–	–
40		5220	44	14	Off	14	–	–	–	11	11	14	–	–	–
40		5240	48	14	Off	14	–	–	–	11	11	14	–	–	–
40	UNII-2	5260	52	17	Off	17	–	–	–	17	17	20	–	–	–
40		5280	56	17	Off	17	–	–	–	17	17	20	–	–	–
40		5300	60	17	Off	17	–	–	–	17	17	20	–	–	–
40		5320	64	17	Off	17	–	–	–	16	16	19	–	–	–
40	UNII-2 ext	5500	100	Not allowed			–	–	–	Not allowed			–	–	–
40		5520	104	Not allowed			–	–	–	Not allowed			–	–	–
40		5540	108	Not allowed			–	–	–	Not allowed			–	–	–
20		5560	112	Not allowed			–	–	–	Not allowed			–	–	–
20		5580	116	Not allowed			–	–	–	Not allowed			–	–	–
20		5600	120	Not allowed			–	–	–	Not allowed			–	–	–
20		5620	124	Not allowed			–	–	–	Not allowed			–	–	–
20		5640	128	Not allowed			–	–	–	Not allowed			–	–	–
20		5660	132	Not allowed			–	–	–	Not allowed			–	–	–
20		5680	136	Not allowed			–	–	–	Not allowed			–	–	–
20		5700	140	Not allowed			–	–	–	Not allowed			–	–	–
20	UNI-3	5745	149	17	Off	17	–	–	–	17	17	20	–	–	–
20		5765	153	17	Off	17	–	–	–	17	17	20	–	–	–
20		5785	157	17	Off	17	–	–	–	17	17	20	–	–	–
20		5805	161	17	Off	17	–	–	–	17	17	20	–	–	–
20	5.8 ISM	5825	165	17	Off	17	–	–	–	17	17	20	–	–	–
40	UNII-1	5180 & 5200	36, 40u, or 40, 36L	–	–	–	17	Off	17	–	–	–	14	14	17
40		5220 & 5240	44, 48U, or 48, 44L	–	–	–	17	Off	17	–	–	–	14	14	17
40	UNII-2	5260 & 5280	52, 56U, or 56, 52L	–	–	–	17	Off	17	–	–	–	17	17	20
40		5300 & 5320	60, 64U, or 64, 60L	–	–	–	17	Off	17	–	–	–	14	14	17
40	UNII-2 ext	5500 & 5520	100, 104U, or 104, 100L	–	–	–	Not allowed			–	–	–	Not allowed		
40		5540 & 5560	108, 112U, or 112, 108L	–	–	–	Not allowed			–	–	–	Not allowed		
40		5580 & 5600	116, 120U, or 120, 116L	–	–	–	Not allowed			–	–	–	Not allowed		
40		5620 & 5640	124, 128U, or 128, 124L	–	–	–	Not allowed			–	–	–	Not allowed		
40		5660 & 5680	132, 136U, or 136, 132L	–	–	–	Not allowed			–	–	–	Not allowed		
40	UNI-3	5745 & 5765	149, 153, or 153, 149L	–	–	–	17	Off	17	–	–	–	17	17	20
40		5785 & 5805	157, 161U, or 161, 157L	–	–	–	17	Off	17	–	–	–	17	17	20

Table 4-13 5-GHz Channels and Maximum Conducted Power in the –S (Singapore) Regulatory Domain

				HW Group 1 Non HT20 Single Antenna 6 to 54 Mbps			HW Group 1 Non HT40 Duplicate Single Antenna 6 to 54 Mbps			HW Group 2 Non HT20 Dual Antennas M0 to M15			HW Group 1 Non HT20 Dual Antennas M0 to M15		
BW	**Band**	**Freq (MHz)**	**CH id**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**
40	UNII-1	5180	36	14	Off	14	–	–	–	16	16	19	–	–	–
40		5200	40	14	Off	14	–	–	–	16	16	19	–	–	–
40		5220	44	14	Off	14	–	–	–	16	16	19	–	–	–
40		5240	48	14	Off	14	–	–	–	16	16	19	–	–	–
40	UNII-2	5260	52	17	Off	17	–	–	–	16	16	19	–	–	–
40		5280	56	17	Off	17	–	–	–	16	16	19	–	–	–
40		5300	60	17	Off	17	–	–	–	16	16	19	–	–	–
40		5320	64	17	Off	17	–	–	–	16	16	19	–	–	–
40	UNII-2 ext	5500	100	Not allowed			–	–	–	Not allowed			–	–	–
40		5520	104	Not allowed			–	–	–	Not allowed			–	–	–
40		5540	108	Not allowed			–	–	–	Not allowed			–	–	–
20		5560	112	Not allowed			–	–	–	Not allowed			–	–	–
20		5580	116	Not allowed			–	–	–	Not allowed			–	–	–
20		5600	120	Not allowed			–	–	–	Not allowed			–	–	–
20		5620	124	Not allowed			–	–	–	Not allowed			–	–	–
20		5640	128	Not allowed			–	–	–	Not allowed			–	–	–
20		5660	132	Not allowed			–	–	–	Not allowed			–	–	–
20		5680	136	Not allowed			–	–	–	Not allowed			–	–	–
20		5700	140	Not allowed			–	–	–	Not allowed			–	–	–
20	UNI-3	5745	149	17	Off	17	–	–	–	17	17	20	–	–	–
20		5765	153	17	Off	17	–	–	–	17	17	20	–	–	–
20		5785	157	17	Off	17	–	–	–	17	17	20	–	–	–
20		5805	161	17	Off	17	–	–	–	17	17	20	–	–	–
20	5.8 ISM	5825	165	17	Off	17	–	–	–	17	17	20	–	–	–
40	UNII-1	5180 & 5200	36, 40u, or 40, 36L	–	–	–	17	Off	17	–	–	–	17	17	20
40		5220 & 5240	44, 48U, or 48, 44L	–	–	–	17	Off	17	–	–	–	17	17	20
40	UNII-2	5260 & 5280	52, 56U, or 56, 52L	–	–	–	17	Off	17	–	–	–	17	17	20
40		5300 & 5320	60, 64U, or 64, 60L	–	–	–	17	Off	17	–	–	–	17	17	20
40	UNII-2 ext	5500 & 5520	100, 104U, or 104, 100L	–	–	–	Not allowed			–	–	–	Not allowed		
40		5540 & 5560	108, 112U, or 112, 108L	–	–	–	Not allowed			–	–	–	Not allowed		
40		5580 & 5600	116, 120U, or 120, 116L	–	–	–	Not allowed			–	–	–	Not allowed		
40		5620 & 5640	124, 128U, or 128, 124L	–	–	–	Not allowed			–	–	–	Not allowed		
40		5660 & 5680	132, 136U, or 136, 132L	–	–	–	Not allowed			–	–	–	Not allowed		
40	UNI-3	5745 & 5765	149, 153, or 153, 149L	–	–	–	17	Off	17	–	–	–	17	17	20
40		5785 & 5805	157, 161U, or 161, 157L	–	–	–	17	Off	17	–	–	–	17	17	20

Table 4-14 5-GHz Channels and Maximum Conducted Power in the –T (Taiwan) Regulatory Domain

				HW Group 1 Non HT20 Single Antenna 6 to 54 Mbps			HW Group 1 Non HT40 Duplicate Single Antenna 6 to 54 Mbps			HW Group 2 Non HT20 Dual Antennas M0 to M15			HW Group 1 Non HT20 Dual Antennas M0 to M15		
BW	**Band**	**Freq (MHz)**	**CH id**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**	**Tx 1**	**Tx 2**	**Total Power**
40	UNII-1	5180	36	Not allowed			–	–	–	Not allowed			–	–	–
40		5200	40	Not allowed			–	–	–	Not allowed			–	–	–
40		5220	44	Not allowed			–	–	–	Not allowed			–	–	–
40		5240	48	Not allowed			–	–	–	Not allowed			–	–	–
40	UNII-2	5260	52	Not allowed			–	–	–	Not allowed			–	–	–
40		5280	56	17	Off	17	–	–	–	11	11	14	–	–	–
40		5300	60	17	Off	17	–	–	–	11	11	14	–	–	–
40		5320	64	17	Off	17	–	–	–	11	11	14	–	–	–
40	UNII-2 ext	5500	100	17	Off	17	–	–	–	17	17	20	–	–	–
40		5520	104	17	Off	17	–	–	–	17	17	20	–	–	–
40		5540	108	17	Off	17	–	–	–	17	17	20	–	–	–
20		5560	112	17	Off	17	–	–	–	17	17	20	–	–	–
20		5580	116	17	Off	17	–	–	–	17	17	20	–	–	–
20		5600	120	17	Off	17	–	–	–	17	17	20	–	–	–
20		5620	124	17	Off	17	–	–	–	17	17	20	–	–	–
20		5640	128	17	Off	17	–	–	–	17	17	20	–	–	–
20		5660	132	17	Off	17	–	–	–	17	17	20	–	–	–
20		5680	136	17	Off	17	–	–	–	17	17	20	–	–	–
20		5700	140	17	Off	17	–	–	–	17	17	20	–	–	–
20	UNI-3	5745	149	17	Off	17	–	–	–	17	17	20	–	–	–
20		5765	153	17	Off	17	–	–	–	17	17	20	–	–	–
20		5785	157	17	Off	17	–	–	–	17	17	20	–	–	–
20		5805	161	17	Off	17	–	–	–	17	17	20	–	–	–
20	5.8 ISM	5825	165	17	Off	17	–	–	–	17	17	20	–	–	–
40	UNII-1	5180 & 5200	36, 40u, or 40, 36L	–	–	–	Not allowed						Not allowed		
40		5220 & 5240	44, 48U, or 48, 44L	–	–	–	Not allowed						Not allowed		
40	UNII-2	5260 & 5280	52, 56U, or 56, 52L	–	–	–	Not allowed						Not allowed		
40		5300 & 5320	60, 64U, or 64, 60L	–	–	–	14	Off	14				14	14	17
40	UNII-2 ext	5500 & 5520	100, 104U, or 104, 100L	–	–	–	17	Off	17				14	14	17
40		5540 & 5560	108, 112U, or 112, 108L	–	–	–	17	Off	17				17	17	20
40		5580 & 5600	116, 120U, or 120, 116L	–	–	–	17	Off	17				17	17	20
40		5620 & 5640	124, 128U, or 128, 124L	–	–	–	17	Off	17				17	17	20
40		5660 & 5680	132, 136U, or 136, 132L	–	–	–	17	Off	17				17	17	20
40	UNI-3	5745 & 5765	149, 153, or 153, 149L	–	–	–	17	Off	17				17	17	20
40		5785 & 5805	157, 161U, or 161, 157L	–	–	–	17	Off	17				17	17	20

Special Country Restrictions

Table 4-15 lists special restrictions for wireless operation in some countries.

Table 4-15 Special Country Restrictions for Wireless Operation

Country	Frequency Bands (GHz)	Regulatory Domain	Special Limitation and Restrictions
South Korea	2.4 and 5	–E and –K	Maximum antenna gain limited to 6 dBi.
Mexico	2.4	–A	End user must limit 2.4 GHz operation to 2450 to 2483.5 MHz and 36 dBm EIRP.
Russian Federation	5	–E	End user must limit 5 GHz operation to 5150 to 5350 and 5650 to 5725 MHz.
United States	5	–A	Indoor use only from 5150-5250 MHz.

Changing Lightweight Access Point Output Power

This section provides instructions for changing the 1140 series access point output power to comply with the maximum power limits imposed by special regulatory and country restrictions (see the "Special Country Restrictions" section on page 4-18). Follow these instructions to change the output power settings using a controller and your browser:

Note Administrator privileges may be required in order to change access point settings.

Caution To meet regulatory restrictions, the access point and the external antenna must be professionally installed. The network administration or other IT professional responsible for installing and configuring the unit is a suitable professional installer. Following installation, access to the unit should be password-protected by the network administrator to maintain regulatory compliance.

The output power on the access points can be changed only using a Cisco wireless LAN controller (2600 series or 4400 series), the controllers on a Cisco Wireless Services Module (WiSM), or using Cisco Wireless Control System (WCS).

Note See the *Cisco Wireless LAN Controller Configuration Guide* for more details on how to to configure your access point using the web-browser interface.

Follow these steps to change the access point's output power to meet local regulations using a controller:

Step 1 Open your Internet browser. You must use Microsoft Internet Explorer 6.0.2800 or a later release.

Step 2 Enter **https://IP address** (where *IP address* is the controller's IP address) in the browser address line and press **Enter**. A user login screen appears.

Step 3 Enter the username and password and press **Enter**. The controller's summary page appears.

Note The username and password are case-sensitive.

Step 4 Click **Wireless** > **802.11a/n Radios** or **802.11b/g/n Radios** and a list of associated access points appears.

Step 5 Choose the desired access point and click **Configure**. The radio settings page appears.

Step 6 Scroll down to the Tx Power Level Assignment field, and click **Custom**.

Custom indicates that the radio output power is manually controlled by the Tx Power Configuration setting field.

Step 7 In the Tx Power Level field, select the appropriate power level setting (1 to 8).

Based on the operating channel, the regulatory domain, and the controller power level setting (1 to 8), the actual transmit power at the access point can be reduced to comply with special regulatory or country restrictions.

Table 16 lists the controller power settings and the corresponding output power levels for these two examples:

- 2.4 GHz) operation in EMEA (–E) regulatory domain:
  - Channel 2 using 11-Mbps data rates with 6-dBi external antenna
- 5 GHz (802.11a) operation:
  - Channel 52 with 6-dBi external antenna

Table 16 Example of Output Power Levels

Controller Tx Power Settings[1]	Radio Output Power	
	802.11b/g/n (dBm)	802.11a/n (dBm)
1 (maximum)	17[2]	17[2]
2	14	14
3	11	11
4	8	8
5	5	5
6	2	2
7	-1	-1
8	–	–

1. The Tx Power Level setting of 1 represents the maximum conducted power setting for the access point. Each subsequent controller power level (such as 2, 3, 4, etc.) represents approximately a 3-dBm reduction in transmit power from the previous power level.
2. The maximum output power levels obtained from Table 4-2 and Table 4-5.

Step 8 Click **Apply**.

Step 9 Close your Internet browser.

CHAPTER 5

Cisco Aironet 1200 Series Access Points

This section lists the 1200 series lightweight access point (models: AIR-LAP1231G and AIR-LAP1232AG) IEEE 802.11g (2.4-GHz) and IEEE 802.11a (5-GHz) channels, maximum power levels, and antenna gains supported by the world's regulatory domains. For additional product hardware information refer to the *Cisco Aironet 1200 Series Access Point Hardware Installation Guide.*

The following topics are covered in this section:

- Channels, page 5-2
- Maximum Power Levels and Antenna Gains, page 5-4
- Power Conversion Table, page 5-9
- Changing the Lightweight Access Point Output Power, page 5-10

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Channels

IEEE 802.11g (2.4-GHz Band)

The channel identifiers, channel center frequencies, and regulatory domains of each IEEE 802.11g 22-MHz-wide channel are shown in Table 5-1.

Table 5-1 Channels for IEEE 802.11g

Channel Identifier	Center Frequency (MHz)	Regulatory Domains					
		–A		–E		–J	
		CCK	OFDM	CCK	OFDM	CCK	OFDM
1	2412	X	X	X	X	X	X
2	2417	X	X	X	X	X	X
3	2422	X	X	X	X	X	X
4	2427	X	X	X	X	X	X
5	2432	X	X	X	X	X	X
6	2437	X	X	X	X	X	X
7	2442	X	X	X	X	X	X
8	2447	X	X	X	X	X	X
9	2452	X	X	X	X	X	X
10	2457	X	X	X	X	X	X
11	2462	X	X	X	X	X	X
12	2467	–	–	X	X	X	X
13	2472	–	–	X	X	X	X
14	2484	–	–	–	–	X	–

Note Mexico is included in the Americas (–A) regulatory domain; however, channels 1 through 8 are for indoor use only while channels 9 through 11 can be used indoors and outdoors. Users are responsible for ensuring that the channel set configuration is in compliance with the regulatory standards of Mexico.

IEEE 802.11a (5-GHz Band)

The channel identifiers, channel center frequencies, and regulatory domains of each IEEE 802.11a 20-MHz-wide channel are shown in Table 5-2.

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Table 5-2 Channels for IEEE 802.11a for the RM21A and RM22A Radio Modules

Channel ID	Center Frequency (MHz)	Regulatory Domains										
		–A	–C	–E	–I	–J	–K	–N	–P	–U	–S	–T
5150 to 5250 MHz												
34	5170	–	–	–	–	X	–	–	–	–	–	–
36	5180	X	–	X	X	–	X	X	X	X	X	–
38	5190	–	–	–	–	X	–	–	–	–	–	–
40	5200	X	–	X	X	–	X	X	X	X	X	–
42	5210	–	–	–	–	X	–	–	–	–	–	–
44	5220	X	–	X	X	–	X	X	X	X	X	–
46	5230	–	–	–	–	X	–	–	–	–	–	–
48	5240	X	–	X	X		X	X	X	X	X	–
5250 to 5350 MHz												
52	5260	X	–	X	X	–	X	X	X	–	X	–
56	5280	X	–	X	X	–	X	X	X	–	X	X
60	5300	X	–	X	X	–	X	X	X	–	X	X
64	5320	X	–	X	X	–	X	X	X	–	X	X
5470 to 5725 MHz												
100	5500	–	–	X	–	–	X	–	–	–	–	–
104	5520	–	–	X	–	–	X	–	–	–	–	–
108	5540	–	–	X	–	–	X	–	–	–	–	–
112	5560	–	–	X	–	–	X	–	–	–	–	–
116	5580	–	–	X	–	–	X	–	–	–	–	–
120	5600	–	–	X	–	–	X	–	–	–	–	–
124	5620	–	–	X	–	–	X	–	–	–	–	–
128	5640	–	–	X	–	–	–	–	–	–	–	–
132	5660	–	–	X	–	–	–	–	–	–	–	–
136	5680	–	–	X	–	–	–	–	–	–	–	–
140	5700	–	–	X	–	–	–	–	–	–	–	–
5725 to 5850 MHz												
149	5745	X	X	–	–	–	X	X	–	–	X	X
153	5765	X	X	–	–	–	X	X	–	–	X	X
157	5785	X	X	–	–	–	X	X	–	–	X	X
161	5805	X	X	–	–	–	X	X	–	–	X	X
165	5825	–	–	–	–	–	–	–	–	–	–	–

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Maximum Power Levels and Antenna Gains

IEEE 802.11g (2.4-GHz Band)

An improper combination of power level and antenna gain can result in equivalent isotropic radiated power (EIRP) above the amount allowed per regulatory domain. Table 5-3 indicates the maximum power levels and antenna gains allowed for each IEEE 802.11g regulatory domain.

Table 5-3 Maximum Power Levels Per Antenna Gain for IEEE 802.11g

Regulatory Domain	Antenna Gain (dBi)	Maximum Power Level (mW)	
		CCK Modulation	OFDM Modulation
–A (4 W EIRP maximum)	2.2	100	30
	5	100	30
	6	100	30
	6.5	100	30
	8.5	100	30
	10	100	30
–E (100 mW EIRP maximum)	2.2	50	30
	5	30	10
	6	30	10
	6.5	20	10
	8.5	10	5
	10	10	5
–I (100 mW EIRP maximum)	2.2	50	30
	5	30	10
	6	30	10
	6.5	20	10
	8.5	10	5
	10	10	5
–J (10 mW/MHz EIRP maximum)	2.2	30	30
	5	30	30
	6	30	30
	6.5	30	30
	8.5	–	–
	10	–	–

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IEEE 802.11a (5-GHz Band)

When shipped from the factory, the RM21A radio modules (with the 5-dBi integrated antenna) support the channels and maximum power levels listed in Table 5-4 for their regulatory domain.

Table 5-4 Maximum Power for RM21A Radio Module with 5-dBi Integrated Antenna

Channel ID	Center Frequency (MHz)	Regulatory Domains										
		–A	–C	–E	–I	–J	–K	–N	–P	–U	–S	–T
5150 to 5250 MHz												
34	5170	–	–	–	–	15	–	–	–	–	–	–
36	5180	15	–	17	17	–	15	15	15	15	17	–
38	5190	–	–	–	–	15	–	–	–	–	–	–
40	5200	15	–	17	17	–	15	15	15	15	17	–
42	5210	–	–	–	–	15	–	–	–	–	–	–
44	5220	15	–	17	17	–	15	15	15	15	17	–
46	5230	–	–	–	–	14	–	–	–	–	–	–
48	5240	15	–	17	17	–	15	15	15	15	17	–
5250 to 5350 MHz												
52	5260	17[1]	–	17[1]	17[1]	–	17[1]	17[1]	14[1]	–	14[1]	–
56	5280	17[1]	–	17[1]	17[1]	–	17[1]	17[1]	14[1]	–	14[1]	15
60	5300	17[1]	–	17[1]	17[1]	–	17[1]	17[1]	14[1]	–	14[1]	15
64	5320	17[1]	–	17[1]	17[1]	–	17[12]	17[1]	14[1]	–	14[1]	15
5470 to 5725 MHz												
100	5500	17[1]	–	17[1]	–	–	17[1]	–	–	–	–	–
104	5520	17[1]	–	17[1]	–	–	17[1]	–	–	–	–	–
108	5540	17[1]	–	17[1]	–	–	17[1]	–	–	–	–	–
112	5560	17[1]	–	17[1]	–	–	17[1]	–	–	–	–	–
116	5580	17[1]	–	17[1]	–	–	17[1]	–	–	–	–	–
120	5600	–	–	17[1]	–	–	17[1]	–	–	–	–	–
124	5620	–	–	17[1]	–	–	17[1]	–	–	–	–	–
128	5640	–	–	17[1]	–	–	–	–	–	–	–	–
132	5660	17[1]	–	17[1]	–	–	–	–	–	–	–	–
136	5680	17[1]	–	17[1]	–	–	–	–	–	–	–	–
140	5700	17[1]	–	17[1]	–	–	–	–	–	–	–	–
5725 to 5850 MHz												
149	5745	17	17	–	–	–	17	17	–	–	17	17
153	5765	17	17	–	–	–	17	17	–	–	17	17
157	5785	17	17	–	–	–	17	17	–	–	17	17
161	5805	17	17	–	–	–	17	17	–	–	17	17
165	5825	–	–	–	–	–	–	–	–	–	–	–

1. Frequencies require DFS (Uniform spreading not required for –P and –U regulatory domains).

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When shipped from the factory, the RM21A radio modules (with the 9-dBi integrated antenna) support the channels and maximum power levels listed in Table 5-5 for their regulatory domain.

Table 5-5 Maximum Power for RM21A Radio Module with 9-dBi Integrated Antenna

Channel ID	Center Frequency (MHz)	Regulatory Domains										
		–A	–C	–E	–I	–J	–K	–N	–P	–U	–S	–T
5150 to 5250 MHz												
34	5170	–	–	–	–	11	–	–	–	–	–	–
36	5180	11	–	14	14	–	15	11	11	11	14	–
38	5190	–	–	–	–	11	–	–	–	–	–	–
40	5200	11	–	14	14	–	15	11	11	11	14	–
42	5210	–	–	–	–	11	–	–	–	–	–	–
44	5220	11	–	14	14	–	15	11	11	11	14	–
46	5230	–	–	–	–	11	–	–	–	–	–	–
48	5240	11	–	14	14	–	15	11	11	11	14	–
5250 to 5350 MHz												
52	5260	17[1]	–	14[1]	14[1]	–	17[1]	17[1]	8[1]	–	11[1]	–
56	5280	17[1]	–	14[1]	14[1]	–	17[1]	17[1]	8[1]	–	11[1]	11
60	5300	17[1]	–	14[1]	14[1]	–	17[1]	17[1]	8[1]	–	11[1]	11
64	5320	11[1]	–	14[1]	14[1]	–	17[1]	17[1]	8[1]	–	11[1]	11
5470 to 5725 MHz												
100	5500	17[1]	–	17[1]	–	–	17[1]	–	–	–	–	–
104	5520	17[1]	–	17[1]	–	–	17[1]	–	–	–	–	–
108	5540	17[1]	–	17[1]	–	–	17[1]	–	–	–	–	–
112	5560	17[1]	–	17[1]	–	–	17[1]	–	–	–	–	–
116	5580	17[1]	–	17[1]	–	–	17[1]	–	–	–	–	–
120	5600	–	–	17[1]	–	–	17[1]	–	–	–	–	–
124	5620	–	–	17[1]	–	–	17[1]	–	–	–	–	–
128	5640	–	–	17[1]	–	–	–	–	–	–	–	–
132	5660	17[1]	–	17[1]	–	–	–	–	–	–	–	–
136	5680	17[1]	–	17[1]	–	–	–	–	–	–	–	–
140	5700	17[1]	–	17[1]	–	–	–	–	–	–	–	–
5725 to 5850 MHz												
149	5745	17	17	–	–	–	17	17	–	–	17	17
153	5765	17	17	–	–	–	17	17	–	–	17	17
157	5785	14	17	–	–	–	17	14	–	–	17	14
161	5805	11	17	–	–	–	17	11	–	–	17	11
165	5825	–	–	–	–	–	–	–	–	–	–	–

1. Frequencies require DFS (Uniform spreading not required for the –P and –U regulatory domains).

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When shipped from the factory, the RM22A radio modules support the channels and maximum power levels listed in Table 5-6 for their regulatory domain.

Table 5-6 Maximum Power for the RM22A Radio Module with Up To 9.5-dBi External Antennas

Channel ID	Center Frequency (MHz)	Regulatory Domains										
		–A	–C	–E[1]	–I[1]	–J	–K[2]	–N[3]	–P	–U	–S	–T
5150 to 5250 MHz												
34	5170	–	–	–	–	11	–	–	–	–	–	–
36	5180	11	–	17	17	–	15	11	11	11	14	–
38	5190	–	–	–	–	11	–	–	–	–	–	–
40	5200	11	–	17	17	–	15	11	11	11	14	–
42	5210	–	–	–	–	11	–	–	–	–	–	–
44	5220	11	–	17	17	–	15	11	11	11	14	–
46	5230	–	–	–	–	11	–	–	–	–	–	–
48	5240	11	–	17	17	–	15	11	11	11	14	–
5250 to 5350 MHz												
52	5260	17[4]	–	17[4]	17[4]	–	17[4]	17[4]	8[4]	–	11[4]	–
56	5280	17[4]	–	17[4]	17[4]	–	17[4]	17[4]	8[4]	–	11[4]	11
60	5300	17[4]	–	17[4]	17[4]	–	17[4]	17[4]	8[4]	–	11[4]	11
64	5320	11[4]	–	17[4]	17[4]	–	17[4]	11[4]	8[4]	–	11[4]	11
5470 to 5725 MHz												
100	5500	17[4]	–	17[4]	–	–	17[4]	–	–	–	–	–
104	5520	17[4]	–	17[4]	–	–	17[4]	–	–	–	–	–
108	5540	17[4]	–	17[4]	–	–	17[4]	–	–	–	–	–
112	5560	17[4]	–	17[4]	–	–	17[4]	–	–	–	–	–
116	5580	17[4]	–	17[4]	–	–	17[4]	–	–	–	–	–
120	5600	–	–	17[4]	–	–	17[4]	–	–	–	–	–
124	5620	–	–	17[4]	–	–	17[4]	–	–	–	–	–
128	5640	–	–	17[4]	–	–	–	–	–	–	–	–
132	5660	17[4]	–	17[4]	–	–	–	–	–	–	–	–
136	5680	17[4]	–	17[4]	–	–	–	–	–	–	–	–
140	5700	17[4]	–	17[4]	–	–	–	–	–	–	–	–
5725 to 5850 MHz												
149	5745	17	17	–	–	–	17	17	–	–	17	17
153	5765	17	17	–	–	–	17	17	–	–	17	17
157	5785	14	17	–	–	–	17	14	–	–	17	14
161	5805	11	17	–	–	–	17	11	–	–	17	11
165	5825	–	–	–	–	–	–	–	–	–	–	–

1. For the –E and –I regulatory domains, see the "Maximum Power Levels in Some Regulatory Domains with External Antennas" section on page 5-8.
2. In South Korea, the AIR-RM22A-N-K9 is approved only with antenna gains of 6 dBi or less.
3. In Australia and New Zealand, the AIR-RM22A-N-K9 is approved only with antenna gains of 6 dBi or less.
4. Frequencies require DFS (Uniform spreading not required for the –P and –U regulatory domains).

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Maximum Power Levels in Some Regulatory Domains with External Antennas

Caution To avoid exceeding maximum conducted power levels in the EMEA (-E) and Israel (–I) regulatory domains when using an external antenna, you must manually set the access point output power level as shown in Table 5-7. The Israel (–I) regulator domain does not support channels 100 to 140.

Note For the latest EMEA (-E) regulatory domain information, refer to the EU Directive 1999/5/EC Compliance Information document that ships with this product.

Table 5-7 RM22A Radio Module Maximum Power with External Antennas in the (–E) and (–I) Regulatory Domains

Channel Identifier	Center Frequency (MHz)	Maximum Power Levels (dBm)				
		4-dBi Antenna	5-dBi Antenna	6-dBi Antenna	7-dBi Antenna	9.5-dBi Antenna
5150 to 5250 MHz						
34	5170	–	–	–	–	–
36	5180	17	17	15	15	11
38	5190	–	–	–	–	–
40	5200	17	17	15	15	11
42	5210	–	–	–	–	–
44	5220	17	17	15	15	11
46	5230	–	–	–	–	–
48	5240	17	17	15	15	11
5250 to 5350 MHz						
52	5260	17	17	15	15	11
56	5280	17	17	15	15	11
60	5300	17	17	15	15	11
64	5320	17	17	15	15	11
5470 to 5725 MHz						
100	5500	17	17	17	17	17
104	5520	17	17	17	17	17
108	5540	17	17	17	17	17
112	5560	17	17	17	17	17
116	5580	17	17	17	17	17
120	5600	17	17	17	17	17
124	5620	17	17	17	17	17
128	5640	17	17	17	17	17
132	5660	17	17	17	17	17
136	5680	17	17	17	17	17
140	5700	17	17	17	17	17
5725 to 5850 MHz						
149	5745	–	–	–	–	–
153	5765	–	–	–	–	–
157	5785	–	–	–	–	–
161	5805	–	–	–	–	–
165	5825	–	–	–	–	–

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Special Country Restrictions

Table 5-8 lists special restrictions for wireless operation in some countries.

Table 5-8 Special Country Restrictions for Wireless Operation

Country	Frequency Band (GHz)	Regulatory Domain	Special Limitation and Restrictions
Australia and New Zealand	5	–N	2.4 and 5 GHz external antenna gain limited to 6 dBi. or less
South Korea	2.4 and 5	–K	2.4 and 5 GHz external antenna gain limited to 6 dBi or less.
Mexico	2.4	–N	End user must limit 2.4 GHz operation to 2450 to 2483.5 MHz and 36 dBm EIRP[1].
Russian Federation	5	–E	End user must limit 5 GHz operation to 5150 to 5350 and 5650 to 5725 MHz.
United States	2.4	–A	Operation limited to indoor use only from 5150-5250 MHz.

1. EIRP (dBm) = maximum output power (dBm) + antenna gain (dBi)

Power Conversion Table

You can use Table 5-9 to convert power values from dBm to mW or from mW to dBm.

Table 5-9 Power Conversion Table

mW	dBm	mW	dBm
200	23	15	12
150	22	12	11
125	21	10	10
100	20	8	9
80	19	6	8
60	18	5	7
50	17	4	6
40	16	3	5
30	15	2	2
25	14	1	–1
20	13	–	

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Changing the Lightweight Access Point Output Power

This section provides instructions for changing the 1200 series access point output power to comply with the maximum power limits imposed by special regulatory and country restrictions (see the"Maximum Power Levels in Some Regulatory Domains with External Antennas" section on page 5-8 and the "Special Country Restrictions" section on page 5-9). Follow these instructions to change the output power settings using a controller and your browser:

Note Administrator privileges may be required in order to change access point settings.

Note Regulatory domains are set at the factory and cannot be changed by the user.

Caution To meet regulatory restrictions, the access point and the external antenna must be professionally installed. The network administration or other IT professional responsible for installing and configuring the unit is a suitable professional installer. Following installation, access to the unit should be password protected by the network administrator to maintain regulatory compliance.

The output power on the access points can be changed only using a Cisco wireless LAN controller (2600 series or 4400 series), the controllers on a Cisco Wireless Services Module (WiSM), or using Cisco Wireless Control System (WCS).

Note See the *Cisco Wireless LAN Controller Configuration Guide* for more details on how to to configure your access point using the web-browser interface.

Follow these steps to change the access point's output power to meet local regulations using a controller:

Step 1 Open your Internet browser. You must use Microsoft Internet Explorer 6.0.2800 or a later release.

Step 2 Enter **https://***IP address* (where *IP address* is the controller's IP address) in the browser address line and press **Enter**. A user login screen appears.

Step 3 Enter the username and password and press **Enter**. The controller's summary page appears.

Note The username and password are case-sensitive.

Step 4 Click **Wireless** > **802.11a Radios** or **802.11b/g Radios** and a list of associated access points appears.

Step 5 Choose the desired access point from the displayed list and click **Configure**. The radio settings page appears.

Step 6 Scroll down to the Tx Power Level Assignment field, and click **Custom**.

Custom indicates that the radio output power is manually controlled by the Tx Power Configuration setting field.

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Step 7 In the Tx Power Level field, select the appropriate power level setting (1 to 8).

Based on the operating channel, the regulatory domain, and the controller power level setting (1 to 8), the actual transmit power at the access point can be reduced to comply with special regulatory or country restrictions.

Table 5-10 lists the controller power settings and the corresponding output power levels for these two examples:

- 2.4-GHz (802.11b/g) operation:
  - (–E) regulatory domain and channel 2 using 11-Mbps data rates
  - 6-dBi external antenna
- 5-GHz (802.11a) operation:
  - (–E) regulatory domain and channel 52 using 36-Mbps data rates
  - RM22A with 6-dBi external antenna

Table 5-10 Example of Output Power Levels

Controller Tx Power Settings[1]	Radio Output Power		
	802.11b (mW)	802.11g (mW)	802.11a (dBm)
1 (maximum)	50 [2]	30[2]	17 [3]
2	25	15	14
3	12	8	11
4	6	4	8
5	3	2	5
6	2	1	2
7	1	–	-1
8	–	–	–

1. The Tx Power Level setting of 1 represents the maximum conducted power setting for the access point. Each subsequent controller power level (such as 2, 3, 4, etc.) represents approximately a 3-dBm reduction in transmit power from the previous power level.
2. The maximum output power levels obtained from Table 5-3 and the values converted using Table 5-9.
3. The maximum output power level of 17 dBi obtained from Table 5-6.

- For 802.11b (CCK) and 802.11g (OFDM) data rates (see Table 5-3 and Table 5-10), the manual controller Tx Power Level setting is 3.
- For only 802.11b (CCK) data rates (see Table 5-3 and Table 5-10), the manual controller Tx Power Level setting is 2.
- For 802.11a (see Table 5-7 and Table 5-10), the manual controller Tx Power Level setting is 2.

Step 8 Click **Apply**.

Step 9 Close your Internet browser.

For additional configuration information, refer to the *Cisco Wireless LAN Controller Configuration Guide*.

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CHAPTER 6

Cisco Aironet 1240 Series Access Points

This chapter lists the 1240 series lightweight access point (models: AIR-LAP1242AG-x-K9 and AIR-LAP1242G-x-K9) IEEE 802.11b/g (2.4-GHz) and the IEEE 802.11a (5-GHz) channels and maximum power levels supported by the world's regulatory domains. For additional product hardware information refer to the *Cisco Aironet 1240AG Series Access Point Hardware Installation Guide*.

The following topics are covered in this chapter:

- Channels and Maximum Power Levels, page 6-2
- Special Country Restrictions, page 6-7
- Changing the Lightweight Access Point Output Power, page 6-7

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Channels and Maximum Power Levels

IEEE 802.11g (2.4-GHz Band)

When shipped from the factory, the AIR-AP1242G-x-K9 (single radio) access points support the channels and maximum power levels listed in Table 6-1 for their regulatory domain.

Note Table 6-1 lists the power levels shipped from the factory. The B columns indicate IEEE 802.11b data rates and the G columns indicate IEEE 802.11g data rates . In the –C, –E, –I, –K, and –S regulatory domains, you must manually adjust power levels depending upon the antenna being used (see Table 6-4).

Table 6-1 Channels and Maximum Conducted Power for the 802.11g Radio with up to 10-dBi External Antennas

Channel Id	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains					
		–A		–J		–P	
		B	G	B	G	B	G
1	2412	20	17	14	14	14	14
2	2417	20	17	14	14	14	14
3	2422	20	17	14	14	14	14
4	2427	20	17	14	14	14	14
5	2432	20	17	14	14	14	14
6	2437	20	17	14	14	14	14
7	2442	20	17	14	14	14	14
8	2447	20	17	14	14	14	14
9	2452	20	17	14	14	14	14
10	2457	20	17	14	14	14	14
11	2462	20	17	14	14	14	14
12	2467	–	–	14	14	14	14
13	2472	–	–	14	14	14	14
14	2484	–	–	14	–	14	–

IEEE 802.11g (2.4-GHz Band)

When shipped from the factory, the AIR-LAP1242AG-x-K9 (dual radio) access points support the channels and maximum power levels listed in Table 6-1 for their regulatory domain.

Note Table 6-2 lists the power levels shipped from the factory. The B columns indicate IEEE 802.11b data rates and the G columns indicate IEEE 802.11g data rates. In the –C, –E, –I, –K, and –S regulatory domains, you must manually adjust power levels depending upon the antenna being used (see Table 6-4).

Table 6-2 Channels and Maximum Conducted Power for the 802.11b/g Radio with up to 10-dBi External Antennas

Channel Id	Center Freq (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains																					
		–A		–C		–E		–I		–J		–K		–N		–P		–Q		–S		–T	
		B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G
1	2412	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	14	14	17	17	20	17
2	2417	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	14	14	17	17	20	17
3	2422	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	14	14	17	17	20	17
4	2427	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	14	14	17	17	20	17
5	2432	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	14	14	17	17	20	17
6	2437	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	14	14	17	17	20	17
7	2442	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	14	14	17	17	20	17
8	2447	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	14	14	17	17	20	17
9	2452	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	14	14	17	17	20	17
10	2457	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	14	14	17	17	20	17
11	2462	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	14	14	17	17	20	17
12	2467	–	–	17	17	17	17	17	17	14	14	17	17	–	–	14	14	14	14	17	17	–	–
13	2472	–	–	17	17	17	17	17	17	14	14	17	17	–	–	14	14	14	14	17	17	–	–
14	2484	–	–	–	–	–	–	–	–	14	–	–	–	–	–	14	–	14	–	–	–	–	–

IEEE 802.11a (5-GHz Band)

When shipped from the factory, the AIR-LAP1242AG-x-K9 (dual radio) access points support the channels and maximum power levels listed in Table 6-3 for their regulatory domain.

Note Table 6-3 lists the power levels shipped from the factory. In the –E and –I regulatory domains, you must manually adjust power levels depending upon the antenna being used (see Table 6-5).

Table 6-3 Channels and Maximum Conducted Power for IEEE 802.11a Radio with up to 9.5-dBI External Antennas

Channel ID	Center Freq (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains											
		–A	–C	–E	–I	–J	–K	–N	–P	–Q	–U	–S	–T
5150 to 5250 MHz													
34	5170	–	–	–	–	11	–	–	–	–	–	–	–
36	5180	11	–	17	17	–	15	11	11	11	11	14	–
38	5190	–	–	–	–	11	–	–	–	–	–	–	–
40	5200	11	–	17	17	–	15	11	11	11	11	14	–
42	5210	–	–	–	–	11	–	–	–	–	–	–	–
44	5220	11	–	17	17	–	15	11	11	11	11	14	–
46	5230	–	–	–	–	11	–	–	–	–	–	–	–
48	5240	11	–	17	17	–	15	11	11	11	11	14	–
5250 to 5350 MHz													
52	5260	17[1]	–	17[2]	17[1]	–	17[1]	17[1]	8[1]	8[1]	–	11[1]	–
56	5280	17[1]	–	17[1]	17[1]	–	17[1]	17[1]	8[1]	8[1]	–	11[1]	11
60	5300	17[1]	–	17[1]	17[1]	–	17[1]	17[1]	8[1]	8[1]	–	11[1]	11
64	5320	11[1]	–	17[1]	17[1]	–	17[1]	11[1]	8[1]	8[1]	–	11[1]	11
5450 to 5725 MHz													
100	5500	17[1]	–	17[1]	–	–	17[1]	–	–	15[1]	–	–	17[1]
104	5520	17[1]	–	17[1]	–	–	17[1]	–	–	15[1]	–	–	17[1]
108	5540	17[1]	–	17[1]	–	–	17[1]	–	–	15[1]	–	–	17[1]
112	5560	17[1]	–	17[1]	–	–	17[1]	–	–	15[1]	–	–	17[1]
116	5580	17[1]	–	17[1]	–	–	17[1]	–	–	15[1]	–	–	17[1]
120	5600	–	–	17[1]	–	–	17[1]	–	–	15[1]	–	–	17[1]
124	5620	–	–	17[1]	–	–	17[1]	–	–	15[1]	–	–	17[1]
128	5640	–	–	17[1]	–	–	–	–	–	15[1]	–	–	17[1]
132	5660	17[1]	–	17[1]	–	–	–	–	–	15[1]	–	–	17[1]
136	5680	17[1]	–	17[1]	–	–	–	–	–	15[1]	–	–	17[1]
140	5700	17[1]	–	17[1]	–	–	–	–	–	15[1]	–	–	17[1]
5725 to 5850 MHz													
149	5745	17	17	–	–	–	17	17	–	–	–	17	17
153	5765	17	17	–	–	–	17	17	–	–	–	17	17
157	5785	14	17	–	–	–	17	14	–	–	–	17	14
161	5805	11	17	–	–	–	17	11	–	–	–	17	11
165	5825	–	–	–	–	–	–	–	–	–	–	–	–

1. Frequencies require DFS (Uniform spreading not required for the –P regulatory domain).

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Maximum Power Levels in Some Regulatory Domains with External Antennas

Caution To avoid exceeding maximum conducted power levels in the China (–C), EMEA (-E), South Korea (–K), Israel (–I), and Singapore (–S) regulatory domains when using an 802.11b/g radio with 2.2- to 10-dBi external antennas, you must manually set the access point output power level as shown in Table 6-4.

Table 6-4 Maximum Power Levels for the 802.11b/g Radio in the (–C), (–E), (–K), (–I), and (–S) Regulatory Domains

Channel Identifier	Center Frequency (MHz)	Maximum Power Levels (dBm)					
		2.2 dBi Antenna	5.2 dBi Antenna	6.0 dBi Antenna	6.5dBi Antenna	9.0 dBi Antenna	10 dBi Antenna
1	2412	17	14	14	11	11	8
2	2417	17	14	14	11	11	8
3	2422	17	14	14	11	11	8
4	2427	17	14	14	11	11	8
5	2432	17	14	14	11	11	8
6	2437	17	14	14	11	11	8
7	2442	17	14	14	11	11	8
8	2447	17	14	14	11	11	8
9	2452	17	14	14	11	11	8
10	2457	17	14	14	11	11	8
11	2462	17	14	14	11	11	8
12	2467	17	14	14	11	11	8
13	2472	17	14	14	11	11	8
14	2484	–	–	–	–	–	–

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Caution To avoid exceeding maximum conducted power levels in the EMEA (-E) and Israel (–I) regulatory domains when using a IEEE 802.11a radio with 6.0- to 9.5-dBi external 5-MHz antennas, you must manually set the access point output power level as shown in Table 6-5.

Table 6-5 Maximum Power Levels for IEEE 802.11a Radio in the EMEA(–E) and Israel (–I) Regulatory Domains

Channel Identifier	Center Frequency (MHz)	Maximum Power Levels (dBm)				
		3.5 dBi Antenna	4.5 dBi Antenna	6.0 dBi Antenna	7.0 dBi Antenna	9.5 dBi Antenna
UNII-1 (5150-5250 MHz)						
34	5170	–	–	–	–	–
36	5180	17	17	15	15	11
38	5190	–	–	–	–	–
40	5200	17	17	15	15	11
42	5210	–	–	–	–	–
44	5220	17	17	15	15	11
46	5230	–	–	–	–	–
48	5240	17	17	15	15	11
5250 to 5350 MHz						
52	5260	17	17	15	15	11
56	5280	17	17	15	15	11
60	5300	17	17	15	15	11
64	5320	17	17	15	15	11
5470 to 5725 MHz						
100	5500	17	17	17	17	17
104	5520	17	17	17	17	17
108	5540	17	17	17	17	17
112	5560	17	17	17	17	17
116	5580	17	17	17	17	17
120	5600	17	17	17	17	17
124	5620	17	17	17	17	17
128	5640	17	17	17	17	17
132	5660	17	17	17	17	17
136	5680	17	17	17	17	17
140	5700	17	17	17	17	17
5725 to 5850 MHz						
149	5745	–	–	–	–	–
153	5765	–	–	–	–	–
157	5785	–	–	–	–	–
161	5805	–	–	–	–	–
165	5825	–	–	–	–	–

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Special Country Restrictions

Table 6-6 lists special restrictions for wireless operation in some countries.

Table 6-6 Special Country Restrictions for Wireless Operation

Country	Frequency Bands (GHz)	Regulatory Domain	Special Limitation and Restrictions
Japan	5	–J, –P, and –U	Operation limited to indoor only.
South Korea	2.4 and 5	–K	Maximum antenna gain limited to 6 dBi.
Mexico	2.4	–N	End user must limit 2.4 GHz operation to 2450 to 2483.5 MHz and 36 dBm EIRP[1].
Russian Federation	5	–E	End user must limit 5 GHz operation to 5150-5350 and 5650 to 5725 MHz.
United States	5	–A	Indoor use only from 5150-5250 MHz.

1. EIRP (dBm) = Maximum output power (dBm) + antenna gain (dBi)

Changing the Lightweight Access Point Output Power

This section provides instructions for changing the 1240 series access point output power to comply with the maximum power limits imposed by special regulatory and country restrictions (see the "Special Country Restrictions" section on page 6-7). Follow these instructions to change the output power settings using a controller and your browser:

Note Administrator privileges may be required in order to change access point settings.

Note Regulatory domains are set at the factory and cannot be changed by the user.

Caution To meet regulatory restrictions, the access point and the external antenna must be professionally installed. The network administration or other IT professional responsible for installing and configuring the unit is a suitable professional installer. Following installation, access to the unit should be password-protected by the network administrator to maintain regulatory compliance.

The output power on the access points can be changed only using a Cisco controllers (such as the 2600 series or 4400 series), the controllers on a Cisco Wireless Services Module (WiSM), or using Cisco Wireless Control System (WCS).

Note See the *Cisco Wireless LAN Controller Configuration Guide* for more details on how to to configure your access point using the web-browser interface.

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Follow these steps to change the access point's output power to meet local regulations using a controller:

Step 1 Open your Internet browser. You must use Microsoft Internet Explorer 6.0.2800 or a later release.

Step 2 Enter **https://IP address** (where *IP address* is the controller's IP address) in the browser address line and press **Enter**. A user login screen appears.

Step 3 Enter the username and password and press **Enter**. The controller's summary page appears.

Note The username and password are case-sensitive.

Step 4 Click **Wireless** > **802.11a Radios** or **802.11b/g Radios** and a list of associated access points displays.

Step 5 Choose the desired access point and click **Configure**. The radio settings page appears.

Step 6 Scroll down to the Tx Power Level Assignment field, and click **Custom**.

Custom indicates that the radio output power is manually controlled by the Tx Power Configuration setting field.

Step 7 In the Tx Power Level field, select the appropriate power level setting (1 to 8).

Based on the operating channel, the regulatory domain, and the controller power level setting (1 to 8), the actual transmit power at the access point can be reduced to comply with special regulatory or country restrictions.

Table 6-7 lists the controller power settings and the corresponding output power levels for these two examples:

- 2.4 GHz (802.11b/g) operation in –E regulatory domain:
  - Channel 2 using 11-Mbps data rates with 6-dBi external antenna
- 5 GHz (802.11a) operation:
  - Channel 52 with 6-dBi external antenna

Table 6-7 Example of Output Power Levels

Controller Tx Power Settings[1]	Radio Output Power	
	802.11b/g (dBm)	802.11a (dBm)
1 (maximum)	17[2]	17[2]
2	14	14
3	11	11
4	8	8
5	5	5
6	2	2
7	-1	-1
8	–	–

1. The Tx Power Level setting of 1 represents the maximum conducted power setting for the access point. Each subsequent controller power level (such as 2, 3, 4, etc.) represents approximately a 3-dBm reduction in transmit power from the previous power level.
2. The maximum output power levels obtained from Table 6-2 and Table 6-3.

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- For 802.11b/g (see Table 6-4 and Table 6-7), the manual controller Tx Power Level setting is 2.
- For 802.11a (see Table 6-5 and Table 6-7), the manual controller Tx Power Level setting is 2.

Step 8 Click **Apply**.

Step 9 Close your Internet browser.

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CHAPTER 7

Cisco Aironet 1250 Series Lightweight Access Points

This section lists the 1250 series lightweight access points (model: AIR-LAP1251) 2.4-GHz and 5-GHz (draft IEEE 802.11n version 2.0) radio channels and maximum power levels supported by the world's regulatory domains. The following topics are covered in this section:

- Channels and Maximum Power Levels, page 7-2
- Special Country Restrictions, page 7-18
- Changing Lightweight Access Point Output Power, page 7-18

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Channels and Maximum Power Levels

Note The access point has been designed to operate with the antennas listed in the product hardware installation guide and having a maximum gain of 10 dBi for 2.4 GHz and 6 dBi for 5 GHz. Antennas not included in this list or having a higher gain are strictly prohibited for use with the access point. The required antenna impedance is 50 ohms.

Note To reduce potential radio interference to other users, the antenna type and its gain should be chosen so that the equivalent isotropically radiated power (e.i.r.p.) is not more than required for successful communication.

2.4 GHz Band (IEEE 802.11n Version 2.0)

An improper combination of power level and antenna gain can result in equivalent isotropic radiated power (EIRP) above the amount allowed per regulatory domain. Table 7-1 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –A regulatory domain for a 2.4-GHz radio.

Table 7-1 802.11 b/g/n 2.4-GHz Maximum Transmit Power

Channel	Frequency (MhZ)	North America		ETSI		Japan	
		B	G	B	G	B	G
1	2412	17	17	17	17	17	17
2	2417	17	17	17	17	17	17
3	2422	17	17	17	17	17	17
4	2427	17	17	17	17	17	17
5	2432	17	17	17	17	17	17
6	2437	17	17	17	17	17	17
7	2442	17	17	17	17	17	17
8	2447	17	17	17	17	17	17
9	2452	17	17	17	17	17	17
10	2457	17	17	17	17	17	17
11	2462	17	17	17	17	17	17
12	2467			14	14	17	17
13	2472			14	14	14	17
14	2484					14	17

2.4 GHz Band (Draft IEEE 802.11n Version 2.0)

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Table 7-2 Channels and Maximum Conducted Power in the –A Regulatory Domain with up to 10-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –A Regulatory Domain for the 2.4-GHz Radio with up to 10-dBi Antennas														
	Center Channel		802.11b Single Antenna 1 to 11 Mbps			802.11g Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			HT-40 MHz Dual Antennas M0 to M15[1]		
Freq (MHz)	20 MHz	40 MHz	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power
2412	1	3	20	OFF	20	17	OFF	17	17	17	20	14	14	17
2417	2	4	20	OFF	20	17	OFF	17	17	17	20	14	14	17
2422	3	5	20	OFF	20	17	OFF	17	17	17	20	14	14	17
2427	4	6	20	OFF	20	17	OFF	17	17	17	20	14	14	17
2432	5	3, 7	20	OFF	20	17	OFF	17	17	17	20	14	14	17
2437	6	4, 8	23	OFF	23	20	OFF	20	17	17	20	17	17	20
2442	7	5, 9	20	OFF	20	17	OFF	17	17	17	20	14	14	17
2447	8	6, 10	20	OFF	20	17	OFF	17	17	17	20	14	14	17
2452	9	7, 11	20	OFF	20	17	OFF	17	17	17	20	14	14	17
2457	10	8	20	OFF	20	17	OFF	17	17	17	20	14	14	17
2462	11	9	20	OFF	20	17	OFF	17	17	17	20	14	14	17
2467	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2472	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2484	–	–	–	–	–	–	–	–	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

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Table 7-3 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –E regulatory domain for a 2.4-GHz radio with up to 3-dBi antennas.

Table 7-3 Channels and Maximum Conducted Power for –E Regulatory Domain with up to 3-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –E Regulatory Domain for the 2.4-GHz Radio with up to 3-dBi Anetnnas														
Freq (MHz)	Center Channel		802.11b Single Antenna 1 to 11 Mbps			802.11g Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			HT-40 MHz Dual Antennas M0 to M15[1]		
	20 MHz	40 MHz	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power
2412	1	3	17	OFF	17	17	OFF	17	14	14	17	14	14	17
2417	2	4	17	OFF	17	17	OFF	17	14	14	17	14	14	17
2422	3	5	17	OFF	17	17	OFF	17	14	14	17	14	14	17
2427	4	6	17	OFF	17	17	OFF	17	14	14	17	14	14	17
2432	5	3, 7	17	OFF	17	17	OFF	17	14	14	17	14	14	17
2437	6	4, 8	17	OFF	17	17	OFF	17	14	14	17	14	14	17
2442	7	5, 9	17	OFF	17	17	OFF	17	14	14	17	14	14	17
2447	8	6, 10	17	OFF	17	17	OFF	17	14	14	17	14	14	17
2452	9	7, 11	17	OFF	17	17	OFF	17	14	14	17	14	14	17
2457	10	8	17	OFF	17	17	OFF	17	14	14	17	14	14	17
2462	11	9	17	OFF	17	17	OFF	17	14	14	17	14	14	17
2467	12	10	17	OFF	17	17	OFF	17	14	14	17	14	14	17
2472	13	11	17	OFF	17	17	OFF	17	14	14	17	14	14	17
2484	–	–	–	–	–	–	–	–	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

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Table 7-4 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –E regulatory domain for a 2.4-GHz radio with up to 6-dBi antennas.

Table 7-4 Channels and Maximum Conducted Power in the –E Regulatory Domain with up to 6-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –E Regulatory Domain for the 2.4-GHz Radio with up to 6-dBi Antennas

	Center Channel		802.11b Single Antenna 1 to 11 Mbps			802.11g Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			HT-40 MHz Dual Antennas M0 to M15[1]		
Freq (MHz)	20 MHz	40 MHz	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power
2412	1	3	14	OFF	14	14	OFF	14	11	11	14	11	11	14
2417	2	4	14	OFF	14	14	OFF	14	11	11	14	11	11	14
2422	3	5	14	OFF	14	14	OFF	14	11	11	14	11	11	14
2427	4	6	14	OFF	14	14	OFF	14	11	11	14	11	11	14
2432	5	3, 7	14	OFF	14	14	OFF	14	11	11	14	11	11	14
2437	6	4, 8	14	OFF	14	14	OFF	14	11	11	14	11	11	14
2442	7	5, 9	14	OFF	14	14	OFF	14	11	11	14	11	11	14
2447	8	6, 10	14	OFF	14	14	OFF	14	11	11	14	11	11	14
2452	9	7, 11	14	OFF	14	14	OFF	14	11	11	14	11	11	14
2457	10	8	14	OFF	14	14	OFF	14	11	11	14	11	11	14
2462	11	9	14	OFF	14	14	OFF	14	11	11	14	11	11	14
2467	12	10	14	OFF	14	14	OFF	14	11	11	14	11	11	14
2472	13	11	14	OFF	14	14	OFF	14	11	11	14	11	11	14
2484	–	–	–	–	–	–	–	–	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

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Table 7-5 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –E regulatory domain for a 2.4-GHz radio with up to 9-dBi antennas.

Table 7-5 Channels and Maximum Conducted Power in the –E Regulatory Domain with up to 9-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –E Regulatory Domain for the 2.4-GHz Radio with up to 9-dBi Antennas														
Freq (MHz)	Center Channel		802.11b Single Antenna 1 to 11 Mbps			802.11g Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			HT-40 MHz Dual Antennas M0 to M15[1]		
	20 MHz	40 MHz	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power
2412	1	3	11	OFF	11	11	OFF	11	8	8	11	8	8	11
2417	2	4	11	OFF	11	11	OFF	11	8	8	11	8	8	11
2422	3	5	11	OFF	11	11	OFF	11	8	8	11	8	8	11
2427	4	6	11	OFF	11	11	OFF	11	8	8	11	8	8	11
2432	5	3, 7	11	OFF	11	11	OFF	11	8	8	11	8	8	11
2437	6	4, 8	11	OFF	11	11	OFF	11	8	8	11	8	8	11
2442	7	5, 9	11	OFF	11	11	OFF	11	8	8	11	8	8	11
2447	8	6, 10	11	OFF	11	11	OFF	11	8	8	11	8	8	11
2452	9	7, 11	11	OFF	11	11	OFF	11	8	8	11	8	8	11
2457	10	8	11	OFF	11	11	OFF	11	8	8	11	8	8	11
2462	11	9	11	OFF	11	11	OFF	11	8	8	11	8	8	11
2467	12	10	11	OFF	11	11	OFF	11	8	8	11	8	8	11
2472	13	11	11	OFF	11	11	OFF	11	8	8	11	8	8	11
2484	–	–	–	–	–	–	–	–	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

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Table 7-6 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –E regulatory domain for a 2.4-GHz radio with up to 10-dBi antennas.

Table 7-6 Channels and Maximum Conducted Power in the –E Regulatory Domain with up to 10-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –E Regulatory Domain for the 2.4-GHz Radio with up to 10-dBi Anetnnas

Freq (MHz)	Center Channel		802.11b Single Antenna 1 to 11 Mbps			802.11g Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			HT-40 MHz Dual Antennas M0 to M15[1]		
	20 MHz	40 MHz	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power
2412	1	3	8	OFF	8	8	OFF	8	5	5	8	5	5	8
2417	2	4	8	OFF	8	8	OFF	8	5	5	8	5	5	8
2422	3	5	8	OFF	8	8	OFF	8	5	5	8	5	5	8
2427	4	6	8	OFF	8	8	OFF	8	5	5	8	5	5	8
2432	5	3, 7	8	OFF	8	8	OFF	8	5	5	8	5	5	8
2437	6	4, 8	8	OFF	8	8	OFF	8	5	5	8	5	5	8
2442	7	5, 9	8	OFF	8	8	OFF	8	5	5	8	5	5	8
2447	8	6, 10	8	OFF	8	8	OFF	8	5	5	8	5	5	8
2452	9	7, 11	8	OFF	8	8	OFF	8	5	5	8	5	5	8
2457	10	8	8	OFF	8	8	OFF	8	5	5	8	5	5	8
2462	11	9	8	OFF	8	8	OFF	8	5	5	8	5	5	8
2467	12	10	8	OFF	8	8	OFF	8	5	5	8	5	5	8
2472	13	11	8	OFF	8	8	OFF	8	5	5	8	5	5	8
2484	–	–	–	–	–	–	–	–	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

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Table 7-7 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –P regulatory domain for a 2.4-GHz radio with up to 10-dBi antennas.

Table 7-7 Channels and Maximum Conducted Power in the –P Regulatory Domain with up to 10-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –P Regulatory Domain for the 2.4 GHz Radio with up to 10 dBi Antennas

Freq (MHz)	Center Channel		802.11b Single Antenna 1 to 11 Mbps			802.11g Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			HT-40 MHz Dual Antennas M0 to M15[1]		
	20 MHz	40 MHz	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power
2412	1	3	14	OFF	14	17	OFF	17	14	14	17	14	14	17
2417	2	4	14	OFF	14	17	OFF	17	14	14	17	14	14	17
2422	3	5	14	OFF	14	17	OFF	17	14	14	17	14	14	17
2427	4	6	14	OFF	14	17	OFF	17	14	14	17	14	14	17
2432	5	3, 7	14	OFF	14	17	OFF	17	14	14	17	14	14	17
2437	6	4, 8	14	OFF	14	17	OFF	17	14	14	17	14	14	17
2442	7	5, 9	14	OFF	14	17	OFF	17	14	14	17	14	14	17
2447	8	6, 10	14	OFF	14	17	OFF	17	14	14	17	14	14	17
2452	9	7, 11	14	OFF	14	17	OFF	17	14	14	17	14	14	17
2457	10	8	14	OFF	14	17	OFF	17	14	14	17	14	14	17
2462	11	9	14	OFF	14	17	OFF	17	14	14	17	14	14	17
2467	12	10	14	OFF	14	17	OFF	17	14	14	17	14	14	17
2472	13	11	14	OFF	14	17	OFF	17	14	14	17	14	14	17
2484	14	–	–	–	–	–	–	–	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

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An improper combination of power level and antenna gain can result in equivalent isotropic radiated power (EIRP) above the amount allowed per regulatory domain.

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Table 7-8 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –A regulatory domain for a 5-GHz radio with up to 6-dBi antennas.

Table 7-8 Channels and Maximum Conducted Power in the –A Regulatory Domain with up to 6-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –A Regulatory Domain for the 5-GHz Radio with up to 6-dBi Antennas													
		802.11a Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			Duplicate (2x20 MHz) Single Antennas 6 Mbps			HT-40 MHz Dual Antennas M0 to M15[1]		
Channel ID	Freq (MHz)	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	–	–	Tx A	Tx B	Total Power
5150-5250 MHz													
36	5180	14	OFF	14	11	11	14	11	–	–	11	11	14
40	5200	14	OFF	14	11	11	14	11	–	–	11	11	14
44	5220	14	OFF	14	11	11	14	11	–	–	11	11	14
48	5240	14	OFF	14	11	11	14	11	–	–	11	11	14
5250 to 5350 MHz													
52	5260	17	OFF	17	17	17	20	17	–	–	17	17	20
56	5280	17	OFF	17	17	17	20	17	–	–	17	17	20
60	5300	17	OFF	17	17	17	20	11	–	–	11	11	14
64	5320	17	OFF	17	17	17	20	11	–	–	11	11	14
5470 to 5725 MHz													
100	5500	17	OFF	17	17	17	20	14	–	–	14	14	17
104	5520	17	OFF	17	17	17	20	14	–	–	14	14	17
108	5540	17	OFF	17	17	17	20	17	–	–	17	17	20
112	5560	17	OFF	17	17	17	20	17	–	–	17	17	20
116	5580	17	OFF	17	17	17	20	–	–	–	–	–	–
120	5600	–	–	–	–	–	–	–	–	–	–	–	–
124	5620	–	–	–	–	–	–	–	–	–	–	–	–
128	5640	–	–	–	–	–	–	–	–	–	–	–	–
132	5660	17	OFF	17	17	17	20	17	–	–	17	17	20
136	5680	17	OFF	17	17	17	20	17	–	–	17	17	20
140	5700	17	OFF	17	17	17	20	–	–	–	–	–	–
5725 to 5850 MHz													
149	5745	17	OFF	17	17	17	20	17	–	–	17	17	20
153	5765	17	OFF	17	17	17	20	17	–	–	17	17	20
157	5785	17	OFF	17	17	17	20	17	–	–	17	17	20
161	5805	17	OFF	17	17	17	20	17	–	–	17	17	20
165	5825	17	OFF	17	17	17	20	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

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Table 7-9 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –C regulatory domain for a 5-GHz radio with up to 6-dBi antennas.

Table 7-9 Channels and Maximum Conducted Power in the –C Regulatory Domain with up to 6-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –C Regulatory Domain for a 5-GHz Radio with up to 6-dBi Antennas													
		802.11a Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			Duplicate (2x20 MHz) Dual Antennas 6 Mbps			HT-40 MHz Dual Antennas M0 to M15[1]		
Channel ID	Freq (MHz)	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	–	–	Tx A	Tx B	Total Power
UNII-1 (5150-5250 MHz)													
36	5180	–	–	–	–	–	–	–	–	–	–	–	–
40	5200	–	–	–	–	–	–	–	–	–	–	–	–
44	5220	–	–	–	–	–	–	–	–	–	–	–	–
48	5240	–	–	–	–	–	–	–	–	–	–	–	–
5250 to 5350 MHz													
52	5260	–	–	–	–	–	–	–	–	–	–	–	–
56	5280	–	–	–	–	–	–	–	–	–	–	–	–
60	5300	–	–	–	–	–	–	–	–	–	–	–	–
64	5320	–	–	–	–	–	–	–	–	–	–	–	–
5470 to 5725 MHz													
100	5500	–	–	–	–	–	–	–	–	–	–	–	–
104	5520	–	–	–	–	–	–	–	–	–	–	–	–
108	5540	–	–	–	–	–	–	–	–	–	–	–	–
112	5560	–	–	–	–	–	–	–	–	–	–	–	–
116	5580	–	–	–	–	–	–	–	–	–	–	–	–
120	5600	–	–	–	–	–	–	–	–	–	–	–	–
124	5620	–	–	–	–	–	–	–	–	–	–	–	–
128	5640	–	–	–	–	–	–	–	–	–	–	–	–
132	5660	–	–	–	–	–	–	–	–	–	–	–	–
136	5680	–	–	–	–	–	–	–	–	–	–	–	–
140	5700	–	–	–	–	–	–	–	–	–	–	–	–
5725 to 5850 MHz													
149	5745	17	OFF	17	17	17	20	17	–	–	17	17	20
153	5765	17	OFF	17	17	17	20	17	–	–	17	17	20
157	5785	17	OFF	17	17	17	20	17	–	–	17	17	20
161	5805	17	OFF	17	17	17	20	17	–	–	17	17	20
165	5825	17	OFF	17	17	17	20	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

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Table 7-10 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –E regulatory domain for a 5-GHz radio with up to 6-dBi antennas.

Table 7-10 Channels and Maximum Conducted Power in the –E Regulatory Domain with up to 6-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –E Regulatory Domain for the 5-GHz Radio with up to 6-dBi Antennas													
		802.11a Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			Duplicate (2x20 MHz) Dual Antennas 6 Mbps			HT-40 MHz Dual Antennas M0 to M15[1]		
Channel ID	Freq (MHz)	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	–	–	Tx A	Tx B	Total Power
UNII-1 (5150-5250 MHz)													
36	5180	17	OFF	17	14	14	17	14	–	–	14	14	17
40	5200	17	OFF	17	14	14	17	14	–	–	14	14	17
44	5220	17	OFF	17	14	14	17	14	–	–	14	14	17
48	5240	17	OFF	17	14	14	17	14	–	–	14	14	17
5250 to 5350 MHz													
52	5260	17	OFF	17	14	14	17	14	–	–	14	14	17
56	5280	17	OFF	17	14	14	17	14	–	–	14	14	17
60	5300	17	OFF	17	14	14	17	14	–	–	14	14	17
64	5320	17	OFF	17	14	14	17	14	–	–	14	14	17
5470 to 5725 MHz													
100	5500	17	OFF	17	17	17	20	17	–	–	17	17	20
104	5520	17	OFF	17	17	17	20	17	–	–	17	17	20
108	5540	17	OFF	17	17	17	20	17	–	–	17	17	20
112	5560	17	OFF	17	17	17	20	17	–	–	17	17	20
116	5580	17	OFF	17	17	17	20	17	–	–	17	17	20
120	5600	17	OFF	17	17	17	20	17	–	–	17	17	20
124	5620	17	OFF	17	17	17	20	17	–	–	17	17	20
128	5640	17	OFF	17	17	17	20	17	–	–	17	17	20
132	5660	17	OFF	17	17	17	20	17	–	–	17	17	20
136	5680	17	OFF	17	17	17	20	17	–	–	17	17	20
140	5700	17	OFF	17	17	17	20		–	–			
5725 to 5850 MHz													
149	5745	–	–	–	–	–	–	–	–	–	–	–	–
153	5765	–	–	–	–	–	–	–	–	–	–	–	–
157	5785	–	–	–	–	–	–	–	–	–	–	–	–
161	5805	–	–	–	–	–	–	–	–	–	–	–	–
165	5825	–	–	–	–	–	–	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

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Table 7-11 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –I regulatory domain for a 5-GHz radio with up to 6-dBi antenna.s

Table 7-11 Channels and Maximum Conducted Power in the –I Regulatory Domain with up to 6-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –I Regulatory Domain for a 5-GHz Radio with up to 6-dBi Antennas													
		802.11a Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			Duplicate (2x20 MHz) Dual Antennas 6 Mbps			HT-40 MHz Dual Antennas M0 to M15[1]		
Channel ID	Freq (MHz)	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	–	–	Tx A	Tx B	Total Power
UNII-1 (5150-5250 MHz)													
36	5180	17	OFF	17	14	14	17	14	–	–	14	14	17
40	5200	17	OFF	17	14	14	17	14	–	–	14	14	17
44	5220	17	OFF	17	14	14	17	14	–	–	14	14	17
48	5240	17	OFF	17	14	14	17	14	–	–	14	14	17
5250 to 5350 MHz													
52	5260	17	OFF	17	14	14	17	14	–	–	14	14	17
56	5280	17	OFF	17	14	14	17	14	–	–	14	14	17
60	5300	17	OFF	17	14	14	17	14	–	–	14	14	17
64	5320	17	OFF	17	14	14	17	14	–	–	14	14	17
5470 to 5725 MHz													
100	5500	–	–	–	–	–	–	–	–	–	–	–	–
104	5520	–	–	–	–	–	–	–	–	–	–	–	–
108	5540	–	–	–	–	–	–	–	–	–	–	–	–
112	5560	–	–	–	–	–	–	–	–	–	–	–	–
116	5580	–	–	–	–	–	–	–	–	–	–	–	–
120	5600	–	–	–	–	–	–	–	–	–	–	–	–
124	5620	–	–	–	–	–	–	–	–	–	–	–	–
128	5640	–	–	–	–	–	–	–	–	–	–	–	–
132	5660	–	–	–	–	–	–	–	–	–	–	–	–
136	5680	–	–	–	–	–	–	–	–	–	–	–	–
140	5700	–	–	–	–	–	–	–	–	–	–	–	–
5725 to 5850 MHz													
149	5745	–	–	–	–	–	–	–	–	–	–	–	–
153	5765	–	–	–	–	–	–	–	–	–	–	–	–
157	5785	–	–	–	–	–	–	–	–	–	–	–	–
161	5805	–	–	–	–	–	–	–	–	–	–	–	–
165	5825	–	–	–	–	–	–	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

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Table 7-12 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –K regulatory domain for a 5-GHz radio with up to 6-dBi antennas.

Table 7-12 Channels and Maximum Conducted Power in the –K Regulatory Domain with up to 6-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –K Regulatory Domain for a 5-GHz Radio with up to 6-dBi Antennas													
		802.11a Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			Duplicate (2x20 MHz) Dual Antennas 6 Mbps			HT-40 MHz Dual Antennas M0 to M15[1]		
Channel ID	Freq (MHz)	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	–	–	Tx A	Tx B	Total Power
UNII-1 (5150-5250 MHz)													
36	5180	14	OFF	14	8	8	11	8	–	–	8	8	11
40	5200	14	OFF	14	8	8	11	8	–	–	8	8	11
44	5220	14	OFF	14	8	8	11	8	–	–	8	8	11
48	5240	14	OFF	14	8	8	11	8	–	–	8	8	11
5250 to 5350 MHz													
52	5260	17	OFF	17	17	17	20	17	–	–	17	17	20
56	5280	17	OFF	17	17	17	20	17	–	–	17	17	20
60	5300	17	OFF	17	17	17	20	17	–	–	17	17	20
64	5320	17	OFF	17	17	17	20	17	–	–	17	17	20
5470 to 5725 MHz													
100	5500	17	OFF	17	17	17	20	17	–	–	17	17	20
104	5520	17	OFF	17	17	17	20	17	–	–	17	17	20
108	5540	17	OFF	17	17	17	20	17	–	–	17	17	20
112	5560	17	OFF	17	17	17	20	17	–	–	17	17	20
116	5580	17	OFF	17	17	17	20	17	–	–	17	17	20
120	5600	17	OFF	17	17	17	20	17	–	–	17	17	20
124	5620	17	OFF	17	17	17	20	17	–	–	–	–	–
128	5640	–	–	–	–	–	–	–	–	–	–	–	–
132	5660	–	–	–	–	–	–	–	–	–	–	–	–
136	5680	–	–	–	–	–	–	–	–	–	–	–	–
140	5700	–	–	–	–	–	–	–	–	–	–	–	–
5725 to 5850 MHz													
149	5745	17	OFF	17	17	17	20	17	–	–	17	17	20
153	5765	17	OFF	17	17	17	20	17	–	–	17	17	20
157	5785	17	OFF	17	17	17	20	17	–	–	17	17	20
161	5805	17	OFF	17	17	17	20	17	–	–	17	17	20
165	5825	–	–	–	–	–	–	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

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Table 7-13 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –N regulatory domain for a 5-GHz radio with up to 6-dBi antennas.

Table 7-13 Channels and Maximum Conducted Power in the –N Regulatory Domain with up to 6-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –N Regulatory Domain for a 5-GHz Radio with up to 6-dBi Antennas													
		802.11a Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			Duplicate (2x20 MHz) Dual Antennas 6 Mbps			HT-40 MHz Dual Antennas M0 to M15[1]		
Channel ID	Freq (MHz)	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	–	–	Tx A	Tx B	Total Power
UNII-1 (5150-5250 MHz)													
36	5180	14	OFF	14	11	11	14	11	–	–	11	11	14
40	5200	14	OFF	14	11	11	14	11	–	–	11	11	14
44	5220	14	OFF	14	11	11	14	11	–	–	11	11	14
48	5240	14	OFF	14	11	11	14	11	–	–	11	11	14
5250 to 5350 MHz													
52	5260	17	OFF	17	14	14	17	14	–	–	14	14	17
56	5280	17	OFF	17	14	14	17	14	–	–	14	14	17
60	5300	17	OFF	17	14	14	17	11	–	–	11	11	14
64	5320	11	OFF	11	14	14	17	11	–	–	11	11	14
5470 to 5725 MHz													
100	5500	–	–	–	–	–	–	–	–	–	–	–	–
104	5520	–	–	–	–	–	–	–	–	–	–	–	–
108	5540	–	–	–	–	–	–	–	–	–	–	–	–
112	5560	–	–	–	–	–	–	–	–	–	–	–	–
116	5580	–	–	–	–	–	–	–	–	–	–	–	–
120	5600	–	–	–	–	–	–	–	–	–	–	–	–
124	5620	–	–	–	–	–	–	–	–	–	–	–	–
128	5640	–	–	–	–	–	–	–	–	–	–	–	–
132	5660	–	–	–	–	–	–	–	–	–	–	–	–
136	5680	–	–	–	–	–	–	–	–	–	–	–	–
140	5700	–	–	–	–	–	–	–	–	–	–	–	–
5725 to 5850 MHz													
149	5745	17	OFF	17	17	17	20	17	–	–	17	17	20
153	5765	17	OFF	17	17	17	20	17	–	–	17	17	20
157	5785	17	OFF	17	17	17	20	17	–	–	17	17	20
161	5805	17	OFF	17	17	17	20	17	–	–	17	17	20
165	5825	17	OFF	17	17	17	20	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

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Table 7-14 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –P regulatory domain for a 5-GHz radio with up to 6-dBi antennas.

Table 7-14 Channels and Maximum Conducted Power in the –P Regulatory Domain with up to 6-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –P Regulatory Domain for the 5-GHz Radio with up to 6-dBi Antennas													
		802.11a Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			Duplicate (2x20 MHz) Dual Antennas 6 Mbps			HT-40 MHz Dual Antennas M0 to M15[1]		
Channel ID	Freq (MHz)	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	–	–	Tx A	Tx B	Total Power
UNII-1 (5150-5250 MHz)													
36	5180	14	OFF	14	11	11	14	11	–	–	11	11	14
40	5200	14	OFF	14	11	11	14	11	–	–	11	11	14
44	5220	14	OFF	14	11	11	14	11	–	–	11	11	14
48	5240	14	OFF	14	11	11	14	11	–	–	11	11	14
5250 to 5350 MHz													
52	5260	14	OFF	14	11	11	14	11	–	–	11	11	14
56	5280	14	OFF	14	11	11	14	11	–	–	11	11	14
60	5300	14	OFF	14	11	11	14	11	–	–	11	11	14
64	5320	14	OFF	14	11	11	14	11	–	–	11	11	14
5470 to 5725 MHz													
100	5500	–	–	–	–	–	–	–	–	–	–	–	–
104	5520	–	–	–	–	–	–	–	–	–	–	–	–
108	5540	–	–	–	–	–	–	–	–	–	–	–	–
112	5560	–	–	–	–	–	–	–	–	–	–	–	–
116	5580	–	–	–	–	–	–	–	–	–	–	–	–
120	5600	–	–	–	–	–	–	–	–	–	–	–	–
124	5620	–	–	–	–	–	–	–	–	–	–	–	–
128	5640	–	–	–	–	–	–	–	–	–	–	–	–
132	5660	–	–	–	–	–	–	–	–	–	–	–	–
136	5680	–	–	–	–	–	–	–	–	–	–	–	–
140	5700	–	–	–	–	–	–	–	–	–	–	–	–
5725 to 5850 MHz													
149	5745	–	–	–	–	–	–	–	–	–	–	–	–
153	5765	–	–	–	–	–	–	–	–	–	–	–	–
157	5785	–	–	–	–	–	–	–	–	–	–	–	–
161	5805	–	–	–	–	–	–	–	–	–	–	–	–
165	5825	–	–	–	–	–	–	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

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Table 7-15 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –S regulatory domain for a 5-GHz radio with up to 6-dBi antennas.

Table 7-15 Channels and Maximum Conducted Power in the –S Regulatory Domain with up to 6-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –S Regulatory Domain for a 5-GHz Radio with up to 6-dBi Antennas													
		802.11a Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			Duplicate (2x20 MHz) Dual Antennas 6 Mbps			HT-40 MHz Dual Antennas M0 to M15[1]		
Channel ID	Freq (MHz)	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	–	–	Tx A	Tx B	Total Power
UNII-1 (5150-5250 MHz)													
36	5180	17	OFF	17	14	14	17	14	–	–	14	14	17
40	5200	17	OFF	17	14	14	17	14	–	–	14	14	17
44	5220	17	OFF	17	14	14	17	14	–	–	14	14	17
48	5240	17	OFF	17	14	14	17	14	–	–	14	14	17
5250 to 5350 MHz													
52	5260	17	OFF	17	14	14	17	14	–	–	14	14	17
56	5280	17	OFF	17	14	14	17	14	–	–	14	14	17
60	5300	17	OFF	17	14	14	17	14	–	–	14	14	17
64	5320	17	OFF	17	14	14	17	14	–	–	14	14	17
5470 to 5725 MHz													
100	5500	–	–	–	–	–	–	–	–	–	–	–	–
104	5520	–	–	–	–	–	–	–	–	–	–	–	–
108	5540	–	–	–	–	–	–	–	–	–	–	–	–
112	5560	–	–	–	–	–	–	–	–	–	–	–	–
116	5580	–	–	–	–	–	–	–	–	–	–	–	–
120	5600	–	–	–	–	–	–	–	–	–	–	–	–
124	5620	–	–	–	–	–	–	–	–	–	–	–	–
128	5640	–	–	–	–	–	–	–	–	–	–	–	–
132	5660	–	–	–	–	–	–	–	–	–	–	–	–
136	5680	–	–	–	–	–	–	–	–	–	–	–	–
140	5700	–	–	–	–	–	–	–	–	–	–	–	–
5725 to 5850 MHz													
149	5745	17	OFF	17	17	17	20	17	–	–	17	17	20
153	5765	17	OFF	17	17	17	20	17	–	–	17	17	20
157	5785	17	OFF	17	17	17	20	17	–	–	17	17	20
161	5805	17	OFF	17	17	17	20	17	–	–	17	17	20
165	5825	17	OFF	17	17	17	20	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

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Table 7-8 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –T regulatory domain for a 5-GHz radio with up to 6-dBi antennas.

Table 7-16 Channels and Maximum Conducted Power in the –T Regulatory Domain with up to 6-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –T Regulatory Domain for a 5-GHz Radio with up to 6-dBi Antennas													
		802.11a Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			Duplicate (2x20 MHz) Dual Antennas 6 Mbps			HT-40 MHz Dual Antennas M0 to M15[1]		
Channel ID	Freq (MHz)	Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	–	–	Tx A	Tx B	Total Power
UNII-1 (5150-5250 MHz)													
36	5180	–	–	–	–	–	–	–	–	–	–	–	–
40	5200	–	–	–	–	–	–	–	–	–	–	–	–
44	5220	–	–	–	–	–	–	–	–	–	–	–	–
48	5240	–	–	–	–	–	–	–	–	–	–	–	–
5250 to 5350 MHz													
52	5260	–	–	–	–	–	–	–	–	–	–	–	–
56	5280	14	OFF	14	11	11	14	–	–	–	–	–	–
60	5300	14	OFF	14	11	11	14	8	–	–	11	11	14
64	5320	14	OFF	14	11	11	14	8	–	–	11	11	14
5470 to 5725 MHz													
100	5500	17	OFF	17	17	17	20	14	–	–	17	17	20
104	5520	17	OFF	17	17	17	20	14	–	–	17	17	20
108	5540	17	OFF	17	17	17	20	14	–	–	17	17	20
112	5560	17	OFF	17	17	17	20	14	–	–	17	17	20
116	5580	17	OFF	17	17	17	20	14	–	–	17	17	20
120	5600	17	OFF	17	17	17	20	14	–	–	17	17	20
124	5620	17	OFF	17	17	17	20	14	–	–	17	17	20
128	5640	17	OFF	17	17	17	20	14	–	–	17	17	20
132	5660	17	OFF	17	17	17	20	14	–	–	17	17	20
136	5680	17	OFF	17	17	17	20	14	–	–	17	17	20
140	5700	17	OFF	17	17	17	20	–	–	–	–	–	–
5725 to 5850 MHz													
149	5745	17	OFF	17	17	17	20	17	–	–	17	17	20
153	5765	17	OFF	17	17	17	20	17	–	–	17	17	20
157	5785	17	OFF	17	17	17	20	17	–	–	17	17	20
161	5805	17	OFF	17	17	17	20	17	–	–	17	17	20
165	5825	17	OFF	17	17	17	20	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

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Special Country Restrictions

Table 7-17 lists special restrictions for wireless operation in some countries.

Table 7-17 Special Country Restrictions for Wireless Operation

Country	Frequency Bands (GHz)	Regulatory Domain	Special Limitation and Restrictions
South Korea	2.4 and 5	–E and –K	Maximum antenna gain limited to 6 dBi.
Mexico	2.4	–A	End user must limit 2.4 GHz operation to 2450 to 2483.5 MHz and 36 dBm EIRP.
Russian Federation	5	–E	End user must limit 5 GHz operation to 5150 to 5350 and 5650 to 5725 MHz.
United States	5	–A	Indoor use only from 5150-5250 MHz.

Changing Lightweight Access Point Output Power

This section provides instructions for changing the 1250 series access point output power to comply with the maximum power limits imposed by special regulatory and country restrictions (see the "Special Country Restrictions" section on page 7-18). Follow these instructions to change the output power settings using a controller and your browser:

Note Administrator privileges may be required in order to change access point settings.

Caution To meet regulatory restrictions, the access point and the external antenna must be professionally installed. The network administration or other IT professional responsible for installing and configuring the unit is a suitable professional installer. Following installation, access to the unit should be password-protected by the network administrator to maintain regulatory compliance.

The output power on the access points can be changed only using a Cisco wireless LAN controller (2600 series or 4400 series), the controllers on a Cisco Wireless Services Module (WiSM), or using Cisco Wireless Control System (WCS).

Note See the *Cisco Wireless LAN Controller Configuration Guide* for more details on how to to configure your access point using the web-browser interface.

Follow these steps to change the access point's output power to meet local regulations using a controller:

Step 1 Open your Internet browser. You must use Microsoft Internet Explorer 6.0.2800 or a later release.

Step 2 Enter **https://IP address** (where *IP address* is the controller's IP address) in the browser address line and press **Enter**. A user login screen appears.

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Step 3 Enter the username and password and press **Enter**. The controller's summary page appears.

Note The username and password are case-sensitive.

Step 4 Click **Wireless** > **802.11a/n Radios** or **802.11b/g/n Radios** and a list of associated access points appears.

Step 5 Choose the desired access point and click **Configure**. The radio settings page appears.

Step 6 Scroll down to the Tx Power Level Assignment field, and click **Custom**.

Custom indicates that the radio output power is manually controlled by the Tx Power Configuration setting field.

Step 7 In the Tx Power Level field, select the appropriate power level setting (1 to 8).

Based on the operating channel, the regulatory domain, and the controller power level setting (1 to 8), the actual transmit power at the access point can be reduced to comply with special regulatory or country restrictions.

Table 18 lists the controller power settings and the corresponding output power levels for these two examples:

- 2.4 GHz) operation in EMEA (–E) regulatory domain:
  - Channel 2 using 11-Mbps data rates with 6-dBi external antenna
- 5 GHz (802.11a) operation:
  - Channel 52 with 6-dBi external antenna

Table 18 Example of Output Power Levels

Controller Tx Power Settings[1]	Radio Output Power	
	802.11b/g/n (dBm)	802.11a/n (dBm)
1 (maximum)	17[2]	17[2]
2	14	14
3	11	11
4	8	8
5	5	5
6	2	2
7	-1	-1
8	–	–

1. The Tx Power Level setting of 1 represents the maximum conducted power setting for the access point. Each subsequent controller power level (such as 2, 3, 4, etc.) represents approximately a 3-dBm reduction in transmit power from the previous power level.
2. The maximum output power levels obtained from Table 7-2 and Table 7-3.

- For 802.11b/g/n (see Table 7-4 and Table 18), the manual controller Tx Power Level setting is 2.
- For 802.11a/n (see Table 7-5 and Table 18), the manual controller Tx Power Level setting is 2.

Step 8 Click **Apply**.

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Step 9 Close your Internet browser.

CHAPTER 8

Cisco Aironet 1300 Series Access Points

This chapter lists the lightweight access point (model: AIR-LAP1310G) IEEE 802.11b/g 2.4-GHz channels, maximum power levels, and antenna gains supported by the world's regulatory domains. For additional product hardware information refer to the *Cisco Aironet 1300 Series Outdoor Access Point/Bridge Hardware Installation Guide*.

The following topics are covered in this chapter:

- Channels, page 8-2
- Maximum Power Levels and Antenna Gains, page 8-3
- Changing the Lightweight Access Point Output Power, page 8-4
- Power Conversion Table, page 8-6

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Channels

IEEE 802.11g (2.4-GHz Band)

The channel identifiers, channel center frequencies, and regulatory domains of each IEEE 802.11b/g 22-MHz-wide channel are shown in Table 8-1.

Table 8-1 Channels for IEEE 802.11b/g

Channel Identifier	Center Frequency (MHz)	Regulatory Domains					
		Americas (–A)		EMEA (–E)		Japan (–J)	
		CCK	OFDM	CCK	OFDM	CCK	OFDM
1	2412	X	X	X	X	X	X
2	2417	X	X	X	X	X	X
3	2422	X	X	X	X	X	X
4	2427	X	X	X	X	X	X
5	2432	X	X	X	X	X	X
6	2437	X	X	X	X	X	X
7	2442	X	X	X	X	X	X
8	2447	X	X	X	X	X	X
9	2452	X	X	X	X	X	X
10	2457	X	X	X	X	X	X
11	2462	X	X	X	X	X	X
12	2467	–	–	X	X	X	X
13	2472	–	–	X	X	X	X
14	2484	–	–	–	–	–	–

Note Mexico is included in the Americas (–A) regulatory domain; however, channels 1 through 8 are for indoor use only while channels 9 through 11 can be used indoors and outdoors. Users are responsible for ensuring that the channel set configuration is in compliance with the regulatory standards of Mexico.

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Maximum Power Levels and Antenna Gains

IEEE 802.11b/g (2.4-GHz Band)

An improper combination of power level and antenna gain can result in equivalent isotropic radiated power (EIRP) above the amount allowed per regulatory domain. Table 8-2 indicates the IEEE 802.11b/g maximum power levels and antenna gains allowed for each regulatory domain.

Note To meet regulatory restrictions, the external antenna access point/bridge and the external antenna must be professionally installed. The network administration or other IT professional responsible for installing and configuring the unit is a suitable professional installer. Following installation, access to the unit should be password-protected by the network administrator to maintain regulatory compliance.

Table 8-2 Maximum Power Levels Per Antenna Gain for IEEE 802.11b/g

Regulatory Domain	Antenna Gain (dBi)	Maximum Power Level (mW)	
		CCK	OFDM
Americas (–A) (4 W EIRP maximum)	2.2 (Omni)	100	30
	5.2 (Omni)	100	30
	9 (Patch)	100	30
	10 (Yagi)	100	30
EMEA (–E) (100 mW EIRP maximum)	2.2 (Omni)	50	30
	5.2 (Omni)	20	20
	9 (Patch)	10	10
	10 (Yagi)	10	10
Japan (-J) (10 mW/MHz EIRP maximum)	2.2 (Omni)	10	10
	5.2 (Omni)	10	10
	9 (Patch)	10	10
	10 (Yagi)	10	10

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Changing the Lightweight Access Point Output Power

This section provides instructions for changing the 1300 series lightweight access point output power to comply with the maximum power limits imposed by regulatory domains (see the "Maximum Power Levels and Antenna Gains" section on page 8-3). Follow these instructions to change the output power settings using your browser:

Note Administrator privileges may be required in order to change access point settings.

Note Regulatory domains are set at the factory and cannot be changed by the user.

The output power on the AIR-LAP1310G-x-K9 (where *x* is the regulatory domain) access points can be changed only by using a Cisco wireless LAN controller (2600 series or 4400 series), the controllers on a Cisco Wireless Services Module (WiSM), or using Cisco Wireless Control System (WCS).

Note See the *Cisco Wireless LAN Controller Configuration Guide* for more details on how to configure your access point using the web-browser interface.

Follow these steps to change the AIR-LAP1310G-x-K9 (where *x* is the regulatory domain) access point's output power to meet local regulations using a controller:

Step 1 Open your Internet browser. You must use Microsoft Internet Explorer 6.0.2800 or a later release.

Step 2 Enter **https://IP address** (where *IP address* is the controller's IP address) in the browser address line and press **Enter**. A user login screen appears.

Step 3 Enter the username and password and press **Enter**. The controller's summary page appears.

Note The username and password are case-sensitive.

Step 4 Click **Wireless** > **802.11b/g Radio** and a list of associated access points appears.

Step 5 Choose the desired access point from the displayed list and click **Configure**. The radio settings page appears.

Step 6 Scroll down to the Tx Power Level Assignment field, and click **Custom**. Custom indicates that the radio output power is manually controlled by the Tx Power Configuration setting field.

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Step 7 In the Tx Power Level field, select the appropriate power level setting (1 to 8).

Based on the configured antenna gain, the configured channel, and the configured power level, the actual transmit power at the access point can be reduced so that the specific country regulations are not exceeded.

Table 8-3 lists the controller power settings and the corresponding output power levels for this example:

- 2.4-GHz (802.11b/g) operation:
  - EMEA (–E) regulatory domain and channel 2
  - 5.2-dBi external antenna

Table 8-3 Available Output Power Levels

Controller Tx Power Settings[1]	Radio Output Power	
	802.11b (mW)	802.11g (mW)
1 (maximum)[2]	50	30
2	25	15
3	12	8
4	6	4
5	3	2
6	2	1
7	-1	–
8		–

1. The Tx Power Level setting of 1 represents the maximum conducted power setting for the access point. Each subsequent power level (such as 2, 3, 4, etc.) represents an approximate 3-dBm reduction in transmit power from the previous power level.
2. See Table 8-2 for the maximum power levels in the –E regulatory domain.

- The manual controller Tx Power Level setting is 3 for 802.11b (CCK) data rates (see Table 8-2).
- The manual controller Tx Power Level setting is 2 for only 802.11g (OFDM) data rates (see Table 8-2).

Step 8 Click **Apply**.

Step 9 Close your Internet browser.

For additional configuration information, refer to the *Cisco Wireless LAN Controller Configuration Guide*.

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Power Conversion Table

You can use Table 8-4 to convert power values from dBm to mW or from mW to dBm.

Table 8-4 Power Conversion Table

mW	dBm	mW	dBm	mW	dBm
200	23	40	16	8	9
150	22	30	15	6	8
125	21	25	14	5	7
100	20	20	13	4	6
80	19	15	12	3	5
60	18	12	11	2	2
50	17	10	10	1	–1

CHAPTER 9

Cisco Aironet 1500 Series Mesh Access Points

This chapter lists the 1500 series mesh access point IEEE 802.11b/g (2.4-GHz) and IEEE 802.11a (5-GHz) channels and the maximum power levels supported by the world's regulatory domains. For additional product hardware information refer to the *Cisco Aironet 1500 Series Outdoor Mesh Access Point Hardware Installation Guide*.

The AIR-LAP1510 access point model supports both 802.11b/g and 802.11a radios. The AIR-LAP1505 access point model only supports a 802.11b/g radio.

The following topics are covered in this chapter:

- Channels and Maximum Power Levels, page 9-2
- Antenna Settings, page 9-5
- Special Country Restrictions, page 9-7

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Channels and Maximum Power Levels

IEEE 802.11b/g (2.4-GHz Band)

When shipped from the factory, the access points support the channels and maximum power levels listed in Table 9-1 for their regulatory domain.

Note In Table 9-1, the operating data rates (in Mbps) are shown in the CCK and OFDM table cells. For example: *CCK 1-11* indicates CCK data rates of 1 to 11 Mbps and *All* indicates all CCK and OFDM data rates.

Note The AIR-LAP1505 access point model only supports the –A, –E, and –P regulatory domains.

Table 9-1 Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 8-dBi Antennas

Channel ID	Center Freq (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains															
		–A				–C	–E	–K	–N				–S				–P
		CCK 1-11	OFDM 6-36	OFDM 48	OFDM 54	All	All	All	CCK 1-11	OFDM 6-36	OFDM 48	OFDM 54	CCK 1-11	OFDM 6-36	OFDM 48	OFDM 54	All
1	2412	23	19.5	19.5	19.5	14	14	14	23	19.5	19.5	19.5	17	17	16	15	14
2	2417	23.5	21.5	21.5	21	14	14	14	23.5	21.5	21.5	21	17	17	16	15	14
3	2422	24	23	22	21	14	14	14	24	23	22	21	17	17	16	15	14
4	2427	24	24	22	21	14	14	14	24	24	22	21	17	17	16	15	14
5	2432	24	24	22	21	14	14	14	24	24	22	21	17	17	16	15	14
6	2437	24	24	22	21	14	14	14	24	24	22	21	17	17	16	15	14
7	2442	24	24	22	21	14	14	14	24	24	22	21	17	17	16	15	14
8	2447	24	24	22	21	14	14	14	24	24	22	21	17	17	16	15	14
9	2452	24	22.5	22	21	14	14	14	24	22.5	22	21	17	17	16	15	14
10	2457	23.5	21.5	21.5	21	14	14	14	23.5	21.5	21.5	21	17	17	16	15	14
11	2462	23	19.5	19.5	19.5	14	14	14	23	19.5	19.5	19.5	17	17	16	15	14
12	2467	–	–	–	–	14	14	14	–	–	–		17	17	16	15	14
13	2472	–	–	–	–	14	14	14	–	–	–		17	17	16	15	14
14	2484	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	14

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IEEE 802.11a (5-GHz Band)

When shipped from the factory, the access points support the channels and maximum power levels listed in Table 9-2 and Table 9-3 for their regulatory domain.

Note In Table 9-2 and Table 9-3, the operating data rates (in Mbps) are shown in the OFDM table cells. For example: *OFDM 6-24* indicates 6 to 24 Mbps data rates and *OFDM All* indicates 6 to 54 Mbps data rates.

Table 9-2 Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 17 dBi Antennas

Channel ID	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains												
		–A				–C				–E				–K
		OFDM 6-24	OFDM 36	OFDM 48	OFDM 54	OFDM 6-24	OFDM 36	OFDM 48	OFDM 54	OFDM 6-24	OFDM 36	OFDM 48	OFDM 54	OFDM All
(4900 to 5100 MHz)														
–	4920	–	–	–	–	–	–	–	–	–	–	–	–	–
–	4940	–	–	–	–	–	–	–	–	–	–	–	–	–
–	4950	20	20	18	17	–	–	–	–	–	–	–	–	–
–	4960	–	–	–	–	–	–	–	–	–	–	–	–	–
–	4980	20	20	18	17	–	–	–	–	–	–	–	–	–
–	5040	–	–	–	–	–	–	–	–	–	–	–	–	–
–	5060	–	–	–	–	–	–	–	–	–	–	–	–	–
–	5080	–	–	–	–	–	–	–	–	–	–	–	–	–
5470 to 5725 MHz														
100	5500	–	–	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]	17[1]
104	5520	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	17[1]
108	5540	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	17[1]
112	5560	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	17[1]
116	5580	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	17[1]
120	5600	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	17[1]
124	5620	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	17[1]
128	5640	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	–
132	5660	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	–
136	5680	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	–
140	5700	–	–	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]	–
5725 to 5850 MHz														
149	5745	26	24	23	20	23	23	23	20	–	–	–	–	–
153	5765	26	24	23	20	23	23	23	20	–	–	–	–	–
157	5785	26	24	23	20	23	23	23	20	–	–	–	–	–
161	5805	26	24	23	20	23	23	23	20	–	–	–	–	–
165	5825	26	24	23	20	–	–	–	–	–	–	–	–	–

1. Requires dynamic frequency selection (DFS) and transmit power control (TPC).

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Table 9-3 Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 17 dBi Antennas

Channel ID	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains											
		–N				–P				–S			
		OFDM 6-24	OFDM 36	OFDM 48	OFDM 54	OFDM 6-24	OFDM 36	OFDM 48	OFDM 54	OFDM 6-24	OFDM 36	OFDM 48	OFDM 54
(4900 to 5100 MHz)													
–	4920	–	–	–	–	17	17	17	17	–	–	–	–
–	4940	–	–	–	–	20	20	18	17	–	–	–	–
–	4950	–	–	–	–	–	–	–	–	–	–	–	–
–	4960	–	–	–	–	20	20	18	17	–	–	–	–
–	4980	–	–	–	–	20[1]	20[1]	18[1]	17[1]	–	–	–	–
–	5040	–	–	–	–	20[2]	20[1]	18[1]	17[1]	–	–	–	–
–	5060	–	–	–	–	20[1]	20[1]	18[1]	17[1]	–	–	–	–
–	5080	–	–	–	–	20[1]	20[1]	18[1]	17[1]	–	–	–	–
5470 to 5725 MHz													
100	5500	–	–	–	–	–	–	–	–	–	–	–	–
104	5520	–	–	–	–	–	–	–	–	–	–	–	–
108	5540	–	–	–	–	–	–	–	–	–	–	–	–
112	5560	–	–	–	–	–	–	–	–	–	–	–	–
116	5580	–	–	–	–	–	–	–	–	–	–	–	–
120	5600	–	–	–	–	–	–	–	–	–	–	–	–
124	5620	–	–	–	–	–	–	–	–	–	–	–	–
128	5640	–	–	–	–	–	–	–	–	–	–	–	–
132	5660	–	–	–	–	–	–	–	–	–	–	–	–
136	5680	–	–	–	–	–	–	–	–	–	–	–	–
140	5700	–	–	–	–	–	–	–	–	–	–	–	–
5725 to 5850 MHz													
149	5745	26	24	23	20	–	–	–	–	20	20	20	20
153	5765	26	24	23	20	–	–	–	–	20	20	20	20
157	5785	26	24	23	20	–	–	–	–	20	20	20	20
161	5805	26	24	23	20	–	–	–	–	20	20	20	20
165	5825	–	–	–	–	–	–	–	–	–	–	–	–

1. Limited license until 11/2007.
2. Limited license until 11/2007.

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Antenna Settings

Maximum Power Levels Allowed in Some Regulatory Domains

An improper combination of power level and antenna gain can result in equivalent isotropic radiated power (EIRP) above the amount allowed per regulatory domain. Table 9-4 indicates the maximum power levels allowed with an 8 dBi external antenna in the –A and –N regulatory domains.

Caution To avoid exceeding maximum conducted power levels in the –A , –N, and –E regulatory domains when using an 8 dBi antennas, you must manually set the access point output power level to not exceed the value shown in Table 9-4 and Table 9-5.

Note In Table 9-4 and Table 9-5, the operating data rates (in Mbps) are shown in the CCK and OFDM table cells. For example: *OFDM 9-24* indicates 9 to 24Mbps data rates and *All OFDM* indicates 6 to 54 Mbps data rates.

Table 9-4 Maximum Power Levels for the 802.11b/g Radio with 8-dBi Antenna (for –A and –N Regulatory Domains)

Channel ID	Center Frequency (MHz)	Maximum Conducted Average Power Levels in dBm			
		CCK 1-11	OFDM 6-36	OFDM 48	OFDM 54
1	2412	23	19.5	19.5	19.5
2	2417	23.5	21.5	21.5	21
3	2422	24	23	22	21
4	2427	24	24	22	21
5	2432	24	24	22	21
6	2437	24	24	22	21
7	2442	24	24	22	21
8	2447	24	24	22	21
9	2452	24	22.5	22	21
10	2457	23.5	21.5	21.5	21
11	2462	23	19.5	19.5	19.5
12	2467	–	–	–	–
13	2472	–	–	–	–
14	2484	–	–	–	–

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Table 9-5 Maximum Power Levels for the 802.11b/g Radio with 8-dBi Antenna (for –E Regulatory Domain)

Channel ID	Center Frequency (MHz)	Maximum Conducted Average Power Levels in dBm			
		CCK 1-11	OFDM 6-36	OFDM 48	OFDM 54
1	2412	12	12	12	12
2	2417	12	12	12	12
3	2422	12	12	12	12
4	2427	12	12	12	12
5	2432	12	12	12	12
6	2437	12	12	12	12
7	2442	12	12	12	12
8	2447	12	12	12	12
9	2452	12	12	12	12
10	2457	12	12	12	12
11	2462	12	12	12	12
12	2467	12	12	12	12
13	2472	12	12	12	12
14	2484	12	12	12	12

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Special Country Restrictions

Table 9-6 lists special restrictions for wireless operation in some countries.

Table 9-6 Special Country Restrictions for Wireless Operation

Country	Frequency Band (GHz)	Regulatory Domain	Special Limitation and Restrictions
Australia	5	–N	5 GHz maximum antenna gain limited to 7 dBi.
China	5	–C	5 GHz maximum antenna gain limited to 9.5 dBi.
EU countries	5	–E	5 GHz maximum antenna gain limited to 7 dBi.
Japan	4.9 and 5	–P	License required for operation in the 4.9 and 5 GHz bands.
South Korea	5	–K	5 GHz maximum antenna gain limited to 7 dBi.
	2.4	–E[1]	2.4 GHz maximum antenna gain limited to 6 dBi.
Mexico	2.4	–N	End user must limit 2.4 GHz operation to 2450 to 2483.5 MHz and 36 dBm EIRP[2].
New Zealand	5	–N	5 GHz maximum antenna gain limited to 7 dBi.
Russian Federation	5	–E	End user must limit 5 GHz operation to 5650 to 5725 MHz.
Singapore	2.4	–S	• Wireless operation is intended for use in confined areas of buildings and localized on-site areas. An IDA license is required for operation over public areas. • Wireless operation is limited to a maximum of 23 dBm EIRP[1].
	5	–S	• Wireless operation is intended for use in confined areas of buildings and localized on-site areas. An IDA license is required for operation over public areas. • 5 GHz maximum antenna gain limited to 9.5 dBi. • An IDA license is required for operation from 30 dBm to 36 dBm EIRP.
United States	4.9	–A	The use of the 4.9-GHz band requires a license and may be used only by qualified Public Safety operators as defined in section 90.20 of the FCC rules.
	2.4	–A and –N	2.4 GHz maximum antenna gain limited to 8 dBi.

1. The LAP1505 access point.
2. EIRP (dBm) = maximum output power (dBm) + antenna gain (dBi)

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Changing the Lightweight Access Point Output Power

This section provides instructions for changing the 1500 series access point output power to comply with the maximum power limits imposed by special regulatory and country restrictions (see the "Antenna Settings" section on page 9-5). Follow these instructions to change the output power settings using a controller and your browser:

Note Administrator privileges may be required in order to change access point settings.

Note Regulatory domains are set at the factory and cannot be changed by the user.

Caution To meet regulatory restrictions, the access point and the external antenna must be professionally installed. The network administration or other IT professional responsible for installing and configuring the unit is a suitable professional installer. Following installation, access to the unit should be password-protected by the network administrator to maintain regulatory compliance.

The output power on the 1500 series access points can be changed only by using a Cisco wireless LAN controller (2600 series or 4400 series), the controllers on a Cisco Wireless Services Module (WiSM), or using Cisco Wireless Control System (WCS).

Note See the *Cisco Wireless LAN Controller Configuration Guide* for more details on how to to configure your access point using the web-browser interface.

Follow these steps to change the 1500 series access point's output power to meet local regulations using a controller:

Step 1 Open your Internet browser. You must use Microsoft Internet Explorer 6.0.2800 or a later release.

Step 2 Enter **https://IP address** (where *IP address* is the controller's IP address) in the browser address line and press **Enter**. A user login screen appears.

Step 3 Enter the username and password and press **Enter**. The controller's summary page appears.

Note The username and password are case-sensitive.

Step 4 Click **Wireless** > **802.11a Radios** or **802.11b/g Radios** and a list of associated access points appears.

Step 5 Choose the desired access point from the displayed list and click **Configure**. The the radio settings page appears.

Step 6 Scroll down to the Tx Power Level Assignment field, and click **Custom**.

Custom indicates that the radio output power is manually controlled by the Tx Power Configuration setting field.

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Step 7 In the Tx Power Level field, select the appropriate power level setting (1 to 5).

Based on the operating channel, the regulatory domain, and the controller power level setting (1 to 5), the actual transmit power at the access point can be reduced to comply with special regulatory or country restrictions.

Note The access point supports only two output power levels for the 2.4-GHz radio and three output power levels for the 5-GHz radio.

Note Table 9-1 and Table 9-2 list the access point maximum output power levels supported for each regulatory domain when the access point is shipped from the factory.

Table 9-7 lists the controller power settings and the corresponding output power levels for these two examples:

- 2.4-GHz (802.11b/g) operation:
  - American regulatory domain
  - Channel 3 using 11-Mbps data rates
- 5-GHz (802.11a) operation:
  - American regulatory domain
  - Channel 149 using 36-Mbps data rates

Table 9-7 Example of Output Power Levels

	Radio Output Power	
Controller Tx Power Settings[1]	**802.11b/g (dBm)**	**802.11a (dBm)**
1 (maximum)	24[2]	24[3]
2	21	21

1. The Tx Power Level setting of 1 represents the maximum conducted power setting for the access point. Each subsequent controller power level (such as 2, 3, 4, etc.) represents an approximate 3-dBm reduction in transmit power from the previous power level.
2. The maximum output power level obtained from Table 9-1.
3. The maximum output power level obtained from Table 9-2.

Step 8 Click **Apply**.

Step 9 Close your Internet browser.

For additional configuration information, refer to the *Cisco Wireless LAN Controller Configuration Guide*.

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CHAPTER 10

Cisco Aironet 1520 Series Mesh Access Points

This chapter lists the 1520 series mesh access point IEEE 802.11b/g (2.4-GHz) and IEEE 802.11a (5-GHz) channels and the maximum power levels supported by the world's regulatory domains. For additional product hardware information refer to the *Cisco Aironet 1520 Series Outdoor Mesh Access Point Hardware Installation Guide.*

The AIR-LAP1522 access point model supports both 802.11b/g and 802.11a radios. The AIR-LAP1521 access point model only supports a 802.11b/g radio. The AIR-LAP1524 access point model supports both 802.11b/g, 802.11a, and 4.9-GHz Public Safety Band radios.

The following topics are covered in this chapter:

- Channels and Maximum Power Levels, page 10-2
- AIR-LAP1521G, page 10-2
- AIR-LAP1522AG, page 10-4
- AIR-LAP1524AG and 4.9-GHz Public Safety Models, page 10-14
- Changing the Lightweight Access Point Output Power, page 10-17

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Channels and Maximum Power Levels

AIR-LAP1521G

IEEE 802.11b/g (2.4-GHz Band)

When shipped from the factory, the AIR-LAP1521G single radio access points support the channels and maximum power levels listed in Table 10-1 for their regulatory domains with up to 5.5 dBi antennas.

Note In Table 10-1 and Table 10-2, the operating data rates (in Mbps) are shown in the CCK and OFDM table cells. For example: *CCK 1-11* indicates CCK data rates of 1 to 11 Mbps and *All* indicates all CCK and OFDM data rates.

Table 10-1 Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 5.5-dBi Antennas

Channel ID	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains					
		–A			–E	–P	
		CCK 1-11	OFDM 6-48	OFDM 54	All	CCK 1-11	OFDM 6-54
1	2412	28	25	25	14	14	16
2	2417	28	26	26	14	14	16
3	2422	28	27	27	14	14	16
4	2427	28	27	27	14	14	16
5	2432	28	27	27	14	14	16
6	2437	28	27	27	14	14	16
7	2442	28	27	27	14	14	16
8	2447	28	27	27	14	14	16
9	2452	28	26	26	14	14	16
10	2457	28	26	26	14	14	16
11	2462	28	25	25	14	14	16
12	2467	–	–	–	14	14	16
13	2472	–	–	–	14	14	16
14	2484	–	–	–		14	

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Table 10-2 indicates the AIR-LAP1521G single radio access point channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the regulatory domains for the 2.4-GHz radio with up to 8-dBi antennas.

Table 10-2 Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 8.0-dBi Antennas

Channel ID	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains					
		–A			–E	–P	
		CCK 1-11	OFDM 6-48	OFDM 54	All	CCK 1-11	OFDM 6-54
1	2412	28	24	24	12	14	16
2	2417	28	25	25	12	14	16
3	2422	28	26	26	12	14	16
4	2427	28	27	27	12	14	16
5	2432	28	27	27	12	14	16
6	2437	28	27	27	12	14	16
7	2442	28	27	27	12	14	16
8	2447	28	27	26	12	14	16
9	2452	28	26	26	12	14	16
10	2457	28	25	25	12	14	16
11	2462	28	24	24	12	14	16
12	2467	–	–	–	12	14	16
13	2472	–	–	–	12	14	16
14	2484	–	–	–		14	

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AIR-LAP1522AG

IEEE 802.11b/g (2.4-GHz Band)

When shipped from the factory, the AIR-LAP1522AG dual radio access points support the channels and maximum power levels listed in Table 10-1 for the regulatory domains using the 2.4-GHz radio with up to 5.5 dBi antennas.

Note In Table 10-1 and Table 10-2, the operating data rates (in Mbps) are shown in the CCK and OFDM table cells. For example: *CCK 1-11* indicates CCK data rates of 1 to 11 Mbps and *All* indicates all CCK and OFDM data rates.

Table 10-3 Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 5.5-dBi Antennas

Channel ID	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains					
		–A			–E	–P	
		CCK 1-11	OFDM 6-48	OFDM 54	All	CCK 1-11	OFDM 6-54
1	2412	28	25	25	14	14	16
2	2417	28	26	26	14	14	16
3	2422	28	27	27	14	14	16
4	2427	28	27	27	14	14	16
5	2432	28	27	27	14	14	16
6	2437	28	27	27	14	14	16
7	2442	28	27	27	14	14	16
8	2447	28	27	27	14	14	16
9	2452	28	26	26	14	14	16
10	2457	28	26	26	14	14	16
11	2462	28	25	25	14	14	16
12	2467	–	–	–	14	14	16
13	2472	–	–	–	14	14	16
14	2484	–	–	–		14	

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Table 10-2 indicates the AIR-LAP1522AG dual radio access point channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the regulatory domains for the 2.4-GHz radio with up to 8-dBi antennas.

Table 10-4 Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 8.0-dBi Antennas

Channel ID	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains					
		–A			–E	–P	
		CCK 1-11	OFDM 6-48	OFDM 54	All	CCK 1-11	OFDM 6-54
1	2412	28	24	24	12	14	16
2	2417	28	25	25	12	14	16
3	2422	28	26	26	12	14	16
4	2427	28	27	27	12	14	16
5	2432	28	27	27	12	14	16
6	2437	28	27	27	12	14	16
7	2442	28	27	27	12	14	16
8	2447	28	27	26	12	14	16
9	2452	28	26	26	12	14	16
10	2457	28	25	25	12	14	16
11	2462	28	24	24	12	14	16
12	2467	–	–	–	12	14	16
13	2472	–	–	–	12	14	16
14	2484	–	–	–		14	

IEEE 802.11a (5-GHz Band)

When shipped from the factory, the AIR-LAP1522AG access points support the channels and maximum power levels listed in Table 10-5 for their regulatory domains with up to 8 dBi antennas.

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Note In Table 10-5, Table 10-6, and Table 10-7, the operating data rates (in Mbps) are shown in the OFDM table cells. For example: *OFDM 6-36* indicates 6 to 36 Mbps data rates.

Table 10-5 Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 8 dBi Antennas

Channel ID	Center Freq (MHz)	Band-width (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains																	
			–A				–C	–E	–K	–N				–P	–S	–T			
			OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54
(4900 to 5100 MHz)																				
1	4942.5	5	20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
2	4947.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
3	4952.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
4	4957.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
5	4962.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
6	4967.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
7	4972.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
8	4977.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
9	4982.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
10	4987.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
11	4945	10	20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
12	5950		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
13	4955		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
14	4960		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
15	4965		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
16	4970		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
17	5975		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
18	4980		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
19	4985		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
184	4920	20	–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
188	4940		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
20	4950		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
21	4955		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
22/192	4960		20	20	20	20	–	–	–	–	–	–	–	20	–	–	–	–	–
23	4965		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
24	4970		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
25	5975		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
26/196	4980		20	20	20	20	–	–	–	–	–	–	–	20	–	–	–	–	–
8	5040		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
12	5060		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
–	–		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

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Table 10-5 Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 8 dBi Antennas (continued)

Channel ID	Center Freq (MHz)	Band-width (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains																	
			–A				–C	–E	–K	–N				–P	–S	–T				
			OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54
(5250 to 5350)																				
52	5260	20	–	–	–	–	–	–		–	–	–	–	–	–	–	–	–	–
56	5280		19[1]	19[1]	19[1]	19[1]	–	–	19[1]	–	–	–	–	–	–	–	–	–	–
60	5300		19[1]	19[1]	19[1]	19[1]	–	–	19[1]	–	–	–	–	–	–	–	–	–	–
64	5320		19[1]	19[1]	19[1]	19[1]	–	–	19[1]	–	–	–	–	–	–	–	–	–	–
(5470 fto 5350)																				
100	5500	20	19[1]	19[1]	19[1]	19[1]	–	22[1]	19[1]	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
104	5520		19[1]	19[1]	19[1]	19[1]	–	22[1]	19[1]	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
108	5540		19[1]	19[1]	19[1]	19[1]	–	22[1]	19[1]	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
112	5560		19[1]	19[1]	19[1]	19[1]	–	22[1]	19[1]	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
116	5580		19[1]	19[1]	19[1]	19[1]	–	22[1]	19[1]	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
120	5600		–	–	–	–	–	22[1]	19[1]	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
124	5620		–	–	–	–	–	22[1]	19[1]	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
128	5640		–	–	–	–	–	22[1]	–	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
132	5660		19[1]	19[1]	19[1]	19[1]	–	22[1]	–	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
136	5680		19[1]	19[1]	19[1]	19[1]	–	22[1]	–	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
140	5700		19[1]	19[1]	19[1]	19[1]	–	22[1]	–	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
5725 to 5850 MHz																				
149	5745	20	28	27	25	24	22	–	–	28	27	25	24	–	22	28	27	25	24
153	5765		28	27	25	24	22	–	–	28	27	25	24	–	22	28	27	25	24
157	5785		28	27	25	24	22	–	–	28	27	25	24	–	22	28	27	25	24
161	5805		28	27	25	24	22	–	–	28	27	25	24	–	22	28	27	25	24
165	5825		28	27	25	24	22	–	–	28	27	25	24	–	22	28	27	25	24

1. Requires dynamic frequency selection (DFS) and transmit power control (TPC).

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Table 10-6 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the regulatory domains for a 5-GHz radio with up to 14-dBi antennas.

Table 10-6 Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 14 dBi Antennas

Channel ID	Center Freq (MHz)	Band-width (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains																	
			–A				–C	–E	–K	–N				–P	–S	–T			
			OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54
(4900 to 5100 MHz)																				
1	4942.5	5	20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
2	4947.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
3	4952.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
4	4957.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
5	4962.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
6	4967.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
7	4972.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
8	4977.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
9	4982.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
10	4987.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
11	4945	10	20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
12	5950		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
13	4955		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
14	4960		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
15	4965		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
16	4970		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
17	5975		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
18	4980		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
19	4985		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
184	4920	20	–	–	–	–	–	–	–	–	–	–	–	17	–	–	–	–	–
188	4940		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
20	4950		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
21	4955		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
22/192	4960		20	20	20	20	–	–	–	–	–	–	–	20	–	–	–	–	–
23	4965		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
24	4970		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
25	5975		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
26/196	4980		20	20	20	20	–	–	–	–	–	–	–	20	–	–	–	–	–
8	5040		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
12	5060		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
16	5080		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

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Table 10-6 Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 14 dBi Antennas (continued)

Channel ID	Center Freq (MHz)	Band-width (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains																	
			–A				–C	–E	–K	–N				–P	–S	–T				
			OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54
(5250 to 5350)																				
52	5260	20	–	–	–	–	–	–		–		–	–	–	–	–	–	–	–
56	5280		13[1]	13[1]	13[1]	13[1]	–	–	–	–		–	–	–	–	–	–	–	–
60	5300		13[1]	13[1]	13[1]	13[1]	–	–	–	–		–	–	–	–	–	–	–	–
64	5320		13[1]	13[1]	13[1]	13[1]	–	–	–	–		–	–	–	–	–	–	–	–
(5470 fto 5350)																				
100	5500	20	13[1]	13[1]	13[1]	13[1]	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
104	5520		13[1]	13[1]	13[1]	13[1]	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
108	5540		13[1]	13[1]	13[1]	13[1]	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
112	5560		13[1]	13[1]	13[1]	13[1]	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
116	5580		13[1]	13[1]	13[1]	13[1]	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
120	5600		–	–	–	–	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
124	5620		–	–	–	–	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
128	5640		–	–	–	–	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
132	5660		13[1]	13[1]	13[1]	13[1]	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
136	5680		13[1]	13[1]	13[1]	13[1]	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
140	5700		13[1]	13[1]	13[1]	13[1]	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
5725 to 5850 MHz																				
149	5745	20	28	27	25	24	–	–	20	28	27	25	24	–	–	28	27	25	24
153	5765		28	27	25	24	–	–	20	28	27	25	24	–	–	28	27	25	24
157	5785		28	27	25	24	–	–	20	28	27	25	24	–	–	28	27	25	24
161	5805		28	27	25	24	–	–	20	28	27	25	24	–	–	28	27	25	24
165	5825		28	27	25	24	–	–	–	28	27	25	24	–	–	28	27	25	24

1. Requires DFS and TPC.

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Table 10-7 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the regulatory domains for a 5-GHz radio with up to 17-dBi antennas.

Table 10-7 Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 17 dBi Antennas

Channel ID	Center Freq (MHz)	Band-width (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains																	
			–A				–C	–E	–K	–N				–P	–S	–T			
			OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54
(4900 to 5100 MHz)																				
1	4942.5	5	20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
2	4947.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
3	4952.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
4	4957.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
5	4962.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
6	4967.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
7	4972.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
8	4977.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
9	4982.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
10	4987.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
11	4945	10	20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
12	5950		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
13	4955		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
14	4960		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
15	4965		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
16	4970		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
17	5975		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
18	4980		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
19	4985		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
184	4920	20	–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
188	4940		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
20	4950		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
21	4955		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
22/192	4960		20	20	20	20	–	–	–	–	–	–	–	20	–	–	–	–	–
23	4965		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
24	4970		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
25	5975		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
26/196	4980		20	20	20	20	–	–	–	–	–	–	–	20	–	–	–	–	–
8	5040		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
12	5060		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
–	–		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

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Table 10-7 Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 17 dBi Antennas (continued)

Channel ID	Center Freq (MHz)	Band-width (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains																	
			–A				–C	–E	–K	–N				–P	–S	–T				
			OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54
(5250 to 5350)																				
52	5260	20	–	–	–	–	–	–		–	–	–	–	–	–	–	–	–	–
56	5280		–	–	–	–	–	–		–	–	–	–	–	–	–	–	–	–
60	5300		–	–	–	–	–	–		–	–	–	–	–	–	–	–	–	–
64	5320		–	–	–	–	–	–		–	–	–	–	–	–	–	–	–	–
(5470 fto 5350)																				
100	5500	20	–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
104	5520		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
108	5540		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
112	5560		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
116	5580		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
120	5600		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
124	5620		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
128	5640		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
132	5660		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
136	5680		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
140	5700		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
5725 to 5850 MHz																				
149	5745	20	28	27	25	24	–	–	20	28	27	25	24	–	–	28	27	25	24
153	5765		28	27	25	24	–	–	20	28	27	25	24	–	–	28	27	25	24
157	5785		28	27	25	24	–	–	20	28	27	25	24	–	–	28	27	25	24
161	5805		28	27	25	24	–	–	20	28	27	25	24	–	–	28	27	25	24
165	5825		28	27	25	24	–	–	–	28	27	25	24	–	–	28	27	25	24

1. Requires DFS and TPC.

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Minimum 5-GHz Radio Power Levels

Table 10-8 lists the minimum power levels supported by the 5-GHz radio for the various channels and regulatory domains.

Note When the minimum radio power level is reached with a controller power setting (1 to 5), changing the controller power setting to a lower value does not result in a lower radio output power level. For example, if the minimum radio power level corresponds to controller level 3, then levels 4 and 5 also correspond to the same power level.

Table 10-8 5-GHz Radio Minimum Power Levels

Channel ID	Center Freq (MHz)	Band-width (MHz)	Minimum Radio Power Levels (dBm) in the Regulatory Domains																
			–A				–C	–E	–K	–N				–P	–S	–T			
			OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54
(4900 to 5100 MHz)																			
1	4942.5	5	8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
2	4947.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
3	4952.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
4	4957.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
5	4962.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
6	4967.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
7	4972.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
8	4977.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
9	4982.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
10	4987.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
11	4945	10	8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
12	5950		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
13	4955		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
14	4960		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
15	4965		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
16	4970		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
17	5975		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
18	4980		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
19	4985		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
184	4920	20	–	–	–	–	–	–	–	–	–	–	–	8	–	–	–	–	–
188	4940		–	–	–	–	–	–	–	–	–	–	–	8	–	–	–	–	–
20	4950		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
21	4955		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
22/192	4960		8	8	8	8	–	–	–	–	–	–	–	8	–	–	–	–	–
23	4965		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
24	4970		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
25	5975		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
26/196	4980		8	8	8	8	–	–	–	–	–	–	–	8	–	–	–	–	–
8	5040		–	–	–	–	–	–	–	–	–	–	–	8	–	–	–	–	–
12	5060		–	–	–	–	–	–	–	–	–	–	–	8	–	–	–	–	–
16	5080		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

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Table 10-8 5-GHz Radio Minimum Power Levels (continued)

Channel ID	Center Freq (MHz)	Band-width (MHz)	Minimum Radio Power Levels (dBm) in the Regulatory Domains																	
			–A				–C	–E	–K	–N				–P	–S	–T				
			OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54
(5250 to 5350)																				
52	5260	20	–	–	–	–	–	–		–		–	–	–	–	–	–	–	–
56	5280		10	10	10	10	–	–	10	–		–	–	–	–	–	–	–	–
60	5300		10	10	10	10	–	–	10	–		–	–	–	–	–	–	–	–
64	5320		10	10	10	10	–	–	10	–		–	–	–	–	–	–	–	–
(5470 fto 5350)																				
100	5500	20	10	10	10	10	–	10	10	–		–	–	–	–	10	10	10	10
104	5520		10	10	10	10	–	10	10	–		–	–	–	–	10	10	10	10
108	5540		10	10	10	10	–	10	10	–		–	–	–	–	10	10	10	10
112	5560		10	10	10	10	–	10	10	–		–	–	–	–	10	10	10	10
116	5580		10	10	10	10	–	10	10	–		–	–	–	–	10	10	10	10
120	5600		–	–	–	–	–	10	10	–		–	–	–	–	10	10	10	10
124	5620		–	–	–	–	–	10	10	–		–	–	–	–	10	10	10	10
128	5640		–	–	–	–	–	10	–	–		–	–	–	–	10	10	10	10
132	5660		10	10	10	10	–	10	–	–		–	–	–	–	10	10	10	10
136	5680		10	10	10	10	–	10	–	–		–	–	–	–	10	10	10	10
140	5700		10	10	10	10	–	10	–	–		–	–	–	–	10	10	10	10
5725 to 5850 MHz																				
149	5745	20	16	16	16	16	16	–	17	16	16	16	16	–	16	16	16	16	16
153	5765		16	16	16	16	16	–	17	16	16	16	16	–	16	16	16	16	16
157	5785		16	16	16	16	16	–	17	16	16	16	16	–	16	16	16	16	16
161	5805		16	16	16	16	16	–	17	16	16	16	16	–	16	16	16	16	16
165	5825		16	16	16	16	16	–	–	16	16	16	16	–	16	16	16	16	16

Special Country Restrictions

Table 10-9 lists special restrictions for wireless operation in some countries.

Table 10-9 Special Country Restrictions for Wireless Operation

Country	Frequency Band (GHz)	Regulatory Domain	Special Limitation and Restrictions
Australia	5	–N	5 GHz maximum antenna gain limited to 8 dBi.
Mexico	2.4	–N	End user must limit 2.4 GHz operation to 2450 to 2483.5 MHz and 36 dBm EIRP[1].
New Zealand	5	–N	5 GHz maximum antenna gain limited to 8 dBi.
United States	4.9	–A	The use of the 4.9-GHz band requires a license and may be used only by qualified public safety operators as defined in section 90.20 of the FCC rules.

1. EIRP (dBm) = maximum output power (dBm) + antenna gain (dBi)

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AIR-LAP1524AG and 4.9-GHz Public Safety Models

IEEE 802.11b/g (2.4-GHz Band)

When shipped from the factory, the AIR-LAP1524AG dual radio access points support the channels and maximum power levels listed in Table 10-10 for the regulatory domains using the 2.4-GHz radio with up to 5.5 dBi antennas.

Table 10-10 Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 5.5-dBi Antennas

Channel ID	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains		
		–A		
		CCK 1-11	OFDM 6-48	OFDM 54
1	2412	28	25	25
2	2417	28	26	26
3	2422	28	27	27
4	2427	28	27	27
5	2432	28	27	27
6	2437	28	27	27
7	2442	28	27	27
8	2447	28	27	27
9	2452	28	26	26
10	2457	28	26	26
11	2462	28	25	25

Table 10-11 indicates the AIR-LAP1524 AG dual radio access point channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the regulatory domains for the 2.4-GHz radio with up to 8-dBi antennas.

Table 10-11 Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 8.0-dBi Antennas

Channel ID	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains		
		–A		
		CCK 1-11	OFDM 6-48	OFDM 54
1	2412	28	24	24
2	2417	28	25	25

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Table 10-11 Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 8.0-dBi Antennas (continued)

Channel ID	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains		
		–A		
		CCK 1-11	OFDM 6-48	OFDM 54
3	2422	28	26	26
4	2427	28	27	27
5	2432	28	27	27
6	2437	28	27	27
7	2442	28	27	27
8	2447	28	27	26
9	2452	28	26	26
10	2457	28	25	25
11	2462	28	24	24

4.9-GHz Public Safety Band

Table 10-12 indicates the AIR-LAP1524 4.9-GHz public safety band radio access point channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the regulatory domains for the 4.9-GHz radio with up to 17-dBi antennas.

Table 10-12 Channels and Maximum Conducted Power for the 4.9-GHz Public Safety Band Radio with Up to 17.0-dBi Antennas

Channel ID	Center Frequency (MHz)	Channel Bandwidth	Maximum Conducted Power Levels (dBm) in the Regulatory Domains
			-A
			6–54
1	4942.5	5 MHz	26
2	4947.5		26
3	4952.5		26
4	4957.5		26
5	4962.5		26
6	4967.5		26
7	4972.5		26
8	4977.5		26
9	4982.5		26
10	4987.5		26

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Table 10-12 Channels and Maximum Conducted Power for the 4.9-GHz Public Safety Band Radio with Up to 17.0-dBi Antennas (continued)

Channel ID	Center Frequency (MHz)	Channel Bandwidth	Maximum Conducted Power Levels (dBm) in the Regulatory Domains
			-A
			6–54
11	4945	10 MHz	26
12	4950		26
13	4955		26
14	4960		26
15	4965		26
16	4970		26
17	4975		26
18	4980		26
19	4985		26
20	4950	20 MHz	26
21	4955		26
22	4960		26
23	4965		26
24	4970		26
25	4975		26
26	4980		26

IEEE 802.11a (5-GHz Band)

When shipped from the factory, the AIR-LAP1524AG access points support the channels and maximum power levels listed in Table 10-12 for their regulatory domains with up to 17 dBi antennas.

Table 10-13 Channels and Maximum Conducted Power for 802.11a Radio with up to 17.0-dBi Antennas

Channel ID	Center Frequency (MHz)	Channel Bandwidth	Maximum Conducted Power Levels (dBm) in the Regulatory Domains			
			-A			
			6–24	36	48	54
149	5745	20 MHz	28	26	25	23
153	5765		28	26	25	23
157	5785		28	26	25	23
161	5805		28	26	25	23
165	5825		28	26	25	23

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Changing the Lightweight Access Point Output Power

This section provides instructions for changing the 1520 series access point output power to comply with the maximum power limits imposed by special regulatory and country restrictions (see the "Minimum 5-GHz Radio Power Levels" section on page 10-12). Follow these instructions to change the output power settings using a controller and your browser:

Note Administrator privileges may be required in order to change access point settings.

Caution To meet regulatory restrictions, the access point and the external antenna must be professionally installed. The network administration or other IT professional responsible for installing and configuring the unit is a suitable professional installer. Following installation, access to the unit should be password-protected by the network administrator to maintain regulatory compliance.

The output power on the 1520 series access points can be changed only by using a Cisco wireless LAN controller (2600 series or 4400 series), the controllers on a Cisco Wireless Services Module (WiSM), or using Cisco Wireless Control System (WCS).

Note See the *Cisco Wireless LAN Controller Configuration Guide* for more details on how to configure your access point using the web-browser interface.

Follow these steps to change the 1520 series access point's output power to meet local regulations using a controller:

Step 1 Open your Internet browser. You must use Microsoft Internet Explorer 6.0.2800 or a later release.

Step 2 Enter **https://IP address** (where *IP address* is the controller's IP address) in the browser address line and press **Enter**. A user login screen appears.

Step 3 Enter the username and password and press **Enter**. The controller's summary page appears.

Note The username and password are case-sensitive.

Step 4 Click **Wireless** and choose **802.11a/n** or **802.11b/g/n** under Access Points / Radios. A list of associated access points appears.

Step 5 Choose the desired access point from the displayed list and click **Configure** from the drop down arrow. The the radio configuration page appears.

Step 6 Scroll to the Tx Power Level Assignment field, and click **Custom**.

Custom indicates that the radio output power is manually controlled by the Tx Power Configuration setting field.

Step 7 In the Tx Power Level field, select the appropriate power level setting (1 to 5).

Based on the operating channel, the regulatory domain, and the controller power level setting (1 to 5), the actual transmit power at the access point can be reduced to comply with special regulatory or country restrictions.

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Note Table 10-1 and Table 10-5 list the access point maximum output power levels supported for each regulatory domain when the access point is shipped from the factory.

Step 8 Click **Apply**.

Step 9 Close your Internet browser.

For additional configuration information, refer to the *Cisco Wireless LAN Controller Configuration Guide*.